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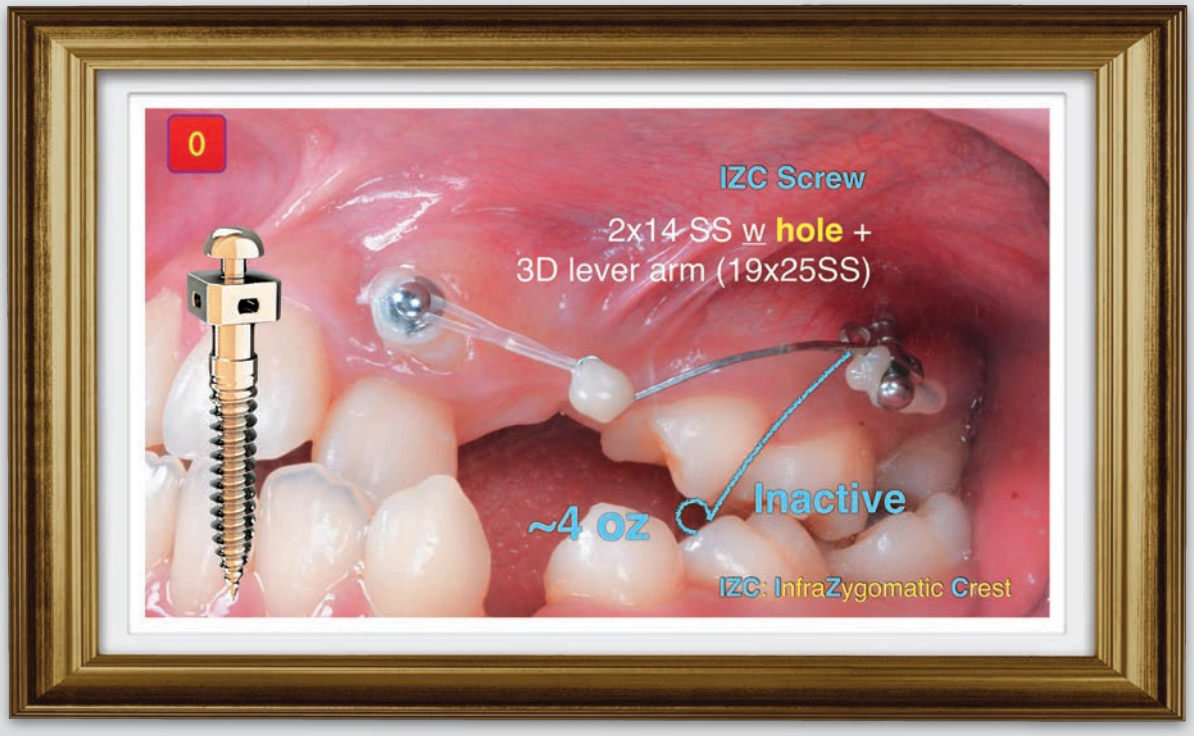

In an upper impaction case, the 3D lever arm (0.019x0.025" SS) is connected to the IZC screw through the 0.022x0.027" rectangular hole in the screw platform. The setup should be designed to the force vector according to the specific situation of the impaction.

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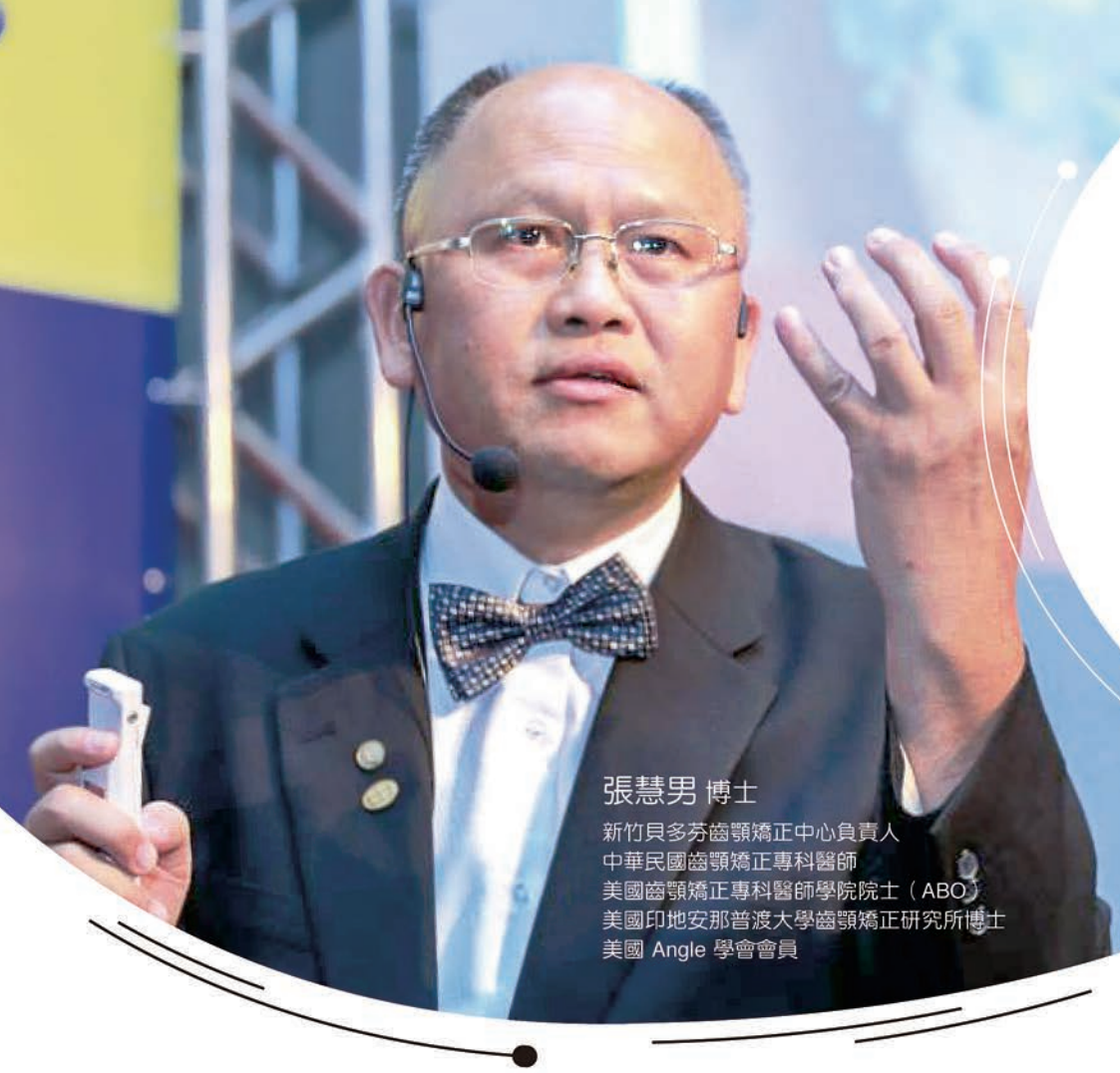

2020-21
熱愛學矯正

全新的貝多芬高效 Damon 矯正大師系列課程是由國際知名講師張慧男醫師親自規劃及授課，課程特色強調由臨床病例帶動診斷、分析、治療計畫擬定與執行技巧。此外，透過數位影片反覆觀看，課堂助教協助操作，以及診間臨床見習，讓學員在短時間能快速上手，感染「熱愛矯正學，熱愛學矯正」的熱情。

Damon Master
(Thu) 9:00-5:00 中文授課

The Beethoven Damon Master Program, created by Dr. Chris Chang, is a two-year clinical program. Its hands-on orientation features case study-based diagnosis, analysis, treatment planning andresult evaluation. Combining in-class teaching assistants, after-class video review and chair-side observation, participants will learn to master the essential tips of the Damon System.

2020-21
Module 1 - **4/23, 5/7**（擇一）
Module 2 - **5/21**
Module 3 - **6/4**
Module 4 - **7/2**
Module 5 - **8/20**
Module 6 - **9/24**
Module 7 - **10/15**
Module 8 - **11/19**
Module 9 - **12/17**
Module 10 - **1/7**/21'

Excellent Finishing
(Tue) 9:00-12:00 中文授課

Critically reviewing classical literature and contemporary papers and applying lessons learned to clinical work; utilising ABO's DI and CRE standards to turning excellent finishing into attainable goals.

Finishing XII
Module 1 - **7/21**
Module 2 - **8/11**
Module 3 - **9/8**
Module 4 - **10/20**
Module 5 - **11/17**
Module 6 - **12/15**
Module 6 - **1/12**/21'
Module 7 - **2/23**
Module 8 - **3/16**
Module 9 - **4/13**
Module 10 - **5/11**

International Workshop
(Digital Orthodontics, OBS & VISTA)
English Class

The workshop provides a 2.5 day, advanced hands-on program to experienced Damon users. The program includes world-class lectures, model and surgical hands-on workshops and clinical observation on patient care and clinic management.

course@newtonsa.com.tw
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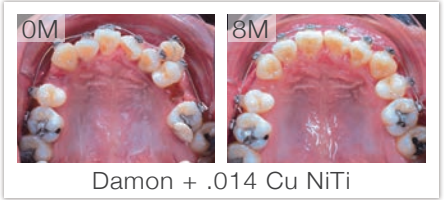
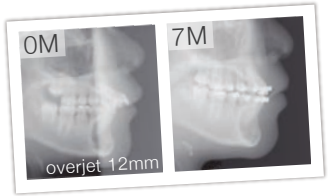
2020
Class 1 - ~~May 12-15~~ cancelled
Class 2 - **Dec 08-11**

2021
Class 1 - **May 18-21** Class 2 - **Dec 07-10**



Damon + .014 Cu NiTi

Damon Clear



Damon + Bite Turbo + Early Light Short Elastic

每次上課請依最新一期 JDO 公告為主

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What is the Purpose of Presentation and Publication?

This year saw a new development in the AAO history – the first ever virtual annual meeting. It was a great honor to kick off this event, and an even greater honor to have received a 99.7% approval rating from my peers.

I have had time during the COVID-19 recess to assess many things to help improve my professional skills. One avenue that I contemplated was my presentation timeline, starting in 2009 up until the aforementioned virtual meeting. I was most touched by a comment that Melissa McCulloch, the Education Specialist of AAO, kindly pointed out to me that my "*wisdom and skill are most valuable and directly transferable to clinical practice and life.*"

As a young orthodontist 30 years ago, I often doubted if I could excel, not only because I felt I was too stupid, but also as all journals and presentations were highly academic, contained too much research data, and hardly any clinically relevant pictures. I made a vow that, one day, if I truly understood orthodontics, I would give the younger generation step-by-step analysis and beautiful self-explanatory photos to free them from the academic torture that so many of us have had to endure!

Orthodontics is in itself logical, but in order to keep the audience's attention, it must also have a certain amount of entertainment value, which consequently will help to achieve high approval ratings. Therefore, during the COVID-19 break, I have decided that it is time to work on JDO. Is not every article actually a work of artistry and engineering, written to educate, entertain, and facilitate our colleagues' practices? Therefore, with this issue, the publishing evolution starts a new chapter, tailor-made for the expectations of today's younger generation.

This issue starts with an article from our grand master, Dr. John Lin, on closing second molar spaces, a very popular and pertinent issue in Asia. Following that are articles about bimaxillary crowding with deep overbite correction and precise bonding of aligner attachments - a "*hot*" topic nowadays. In the research section, there is an article that deals with impacted maxillary canines using OBS. Finally, there is Dr. Stéphane Renger from the French Society of Dento-Facial Orthopedics, interviewing "*moi*" on my journey from childhood to being an international speaker. This is without a doubt the best interview I have ever had. Also the only one published!

I am sure that, with an open mind, hard work, and high quality, relevant case reports, we will be able to cater for those interested in improving their digital orthodontic skills, and eventually to reach a similarly high approval rating. This journal should be, has to be and will be, a beacon in the orthodontic profession and allow those who so wish to join us to be on the path to glory.

Stay safe and well.

Chris Chang PhD, ABO Certified, Publisher of JDO

Partially Edentulous Asymmetric Class III Malocclusion: Lower Second Molar Extraction, Autotransplantation, and Space Closure

Abstract

***Diagnosis**: A 34-year-7-month-old female presented with chief complaints of compromised facial esthetics and unilateral collapse of posterior occlusion. Clinical examination revealed mandibular prognathism, facial asymmetry, Class III malocclusion, missing LL6, residual roots of LL7 and LL8, and over eruption of UL5-UL7. The Discrepancy Index (DI) was 25.*

***Treatment**: A conservative treatment plan was designed to preserve the natural dentition. To create a symmetric occlusal plane, the UL5-UL7 segment was intruded with anchorage provided by two 2x8-mm mini-screws. The LR7 was endodontically treated and autotransplanted into the LL7 extraction socket. A passive self-ligating appliance was installed to align and retract the lower dentition to correct the Class III molar relationship.*

***Outcomes**: The autotransplanted molar healed successfully, and subsequently ankylosed in an acceptable position. The bite was opened about 1.5°, crowding was corrected, and the dentition was well aligned to Class I canine and molar relationships. The ABO Cast-Radiograph Evaluation (CRE) was 22, and the Pink & White dental esthetics score was 7. (J Digital Orthod 2020;59:4-19)*

Key words:
Autotransplantation, Class III malocclusion, increased vertical dimension of occlusion, molar intrusion, facial asymmetry, mandibular arch retraction

Introduction

The dental nomenclature for this report is a modified Palmer notation. Upper (*U*) and lower (*L*) arches, as well as the right (*R*) and left (*L*) sides, define four oral quadrants: UR, UL, LR and LL. Teeth are numbered 1-8 from the midline in each quadrant, e.g. a lower right first molar is LR6.

History

A 34-year-7-month-old female presented for orthodontic consultation with chief complaints: protrusive lower lip and poor chewing ability. The pre-treatment facial photographs (*Fig. 1*) show a straight profile (*G-Sn-Pg' 0*°), long face, and facial asymmetry (*Table 1*). Intra-oral examination revealed a Class III malocclusion with anterior crossbite (*right side*). The lower dental midline and chin were deviated to the right about 2-5mm. All of the LL molars were compromised by caries: LL6 was missing, but residual roots remained for LL7 and LL8. The UL5-UL7 segment was over-erupted, the mandible was protrusive, vertical dimension of occlusion (*VDO*) was excessive, and lips were incompetent (*Figs. 1-3*). The asymmetric intermaxillary molar relationship was 8mm Class III on the right side.

Eric Hsu,
Lecturer, Beethoven Orthodontic Course (Left)

Po-Jan Kuo,
Periodontist, Jing-Jong Lin Orthodontic Clinic (Center left)

John Jin-Jong Lin,
Examiner, Journal of Digital Orthodontics
Director, Jin-Jong Lin Orthodontic Clinic (Center right)

W. Eugene Roberts,
Editor-in-Chief, Journal of Digital Orthodontics (Right)

Fig. 1: Pre-treatment facial photographs, 34y7m female

Fig. 4: Post-treatment facial photographs, after 25 months of active treatment

Fig. 2: Pre-treatment intra-oral photographs

Fig. 5: Post-treatment intra-oral photographs

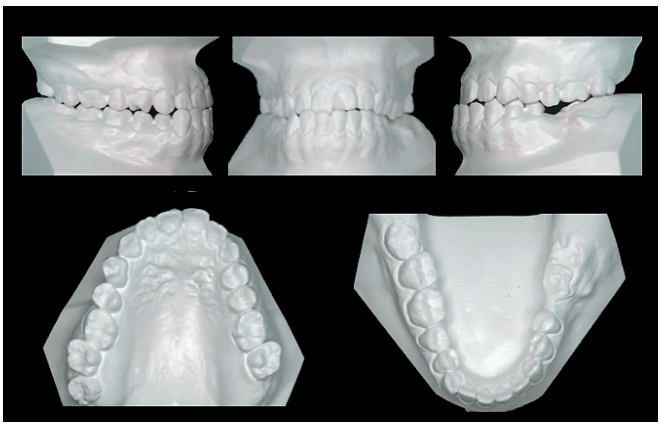

Fig. 3: Pre-treatment study models (casts)

Fig. 6: Post-treatment study models (casts)

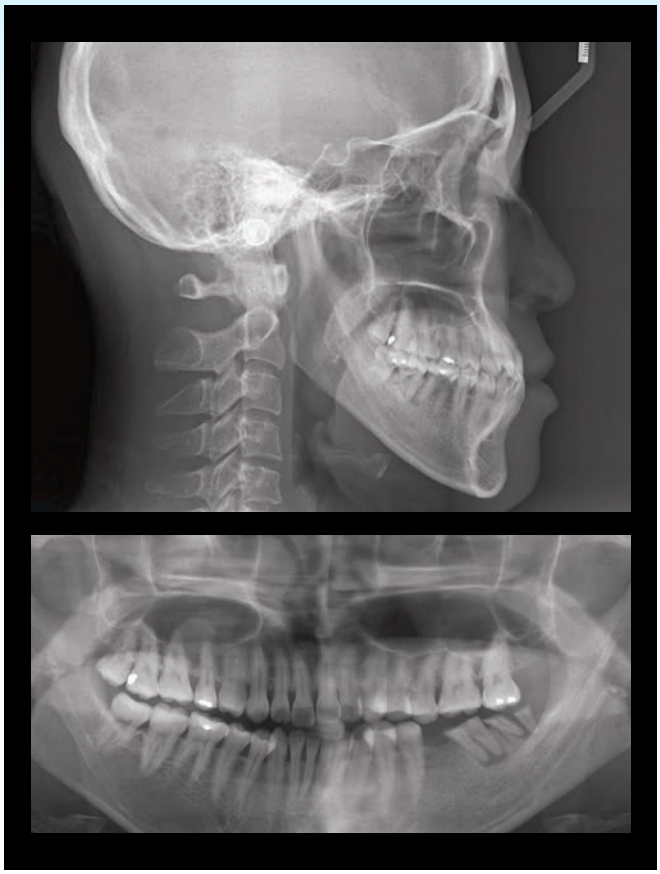

Fig. 7:
Pre-treatment cephalometric and panoramic radiographs document the original dentofacial morphology. The panoramic film (lower) reveals the over-eruption of UL5-UL7.

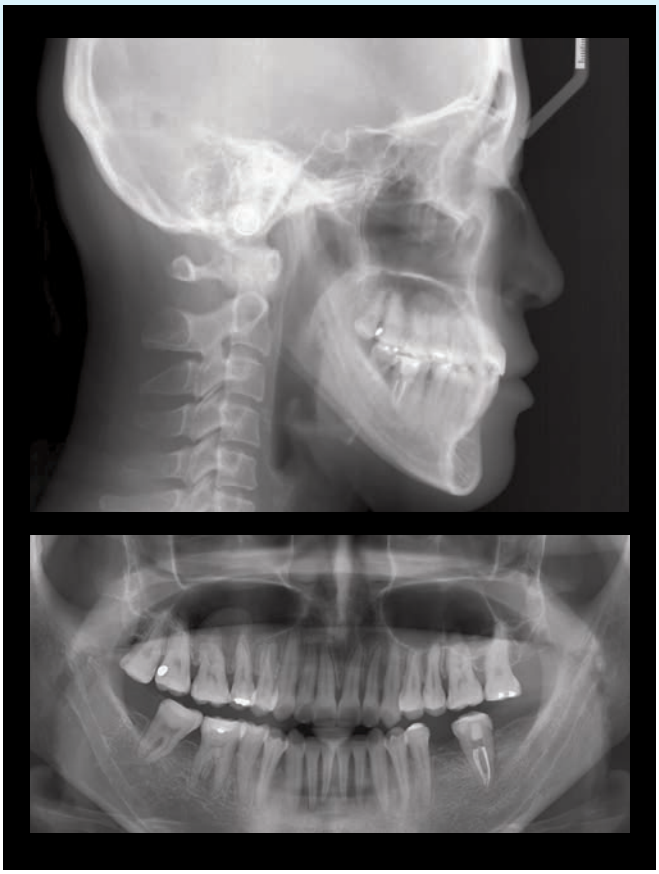

Fig. 8:
Post-treatment cephalometric and panoramic radiographs reveal the dentofacial morphology immediately after fixed appliances were removed.

Medical history was non-contributory, and there was no evidence of temporomandibular dysfunction (*TMD*). This case report demonstrates the correction of a severe, asymmetric, and partially edentulous Class III malocclusion with mini-screw anchorage and autotransplantation of a mandibular molar (*Figs. 4-6*). Pre-treatment and post-treatment cephalometric and panoramic radiographs are compared in Figs. 7 and 8, respectively. The dentofacial changes associated with comprehensive treatment are documented with superimposed cephalometric tracings (*Fig. 9*).

Diagnosis

Facial:

- Length: *Long tapered face in the frontal plane*
- Facial Convexity: *Concave profile, G-Sn-Pg' 0º*
- Symmetry: *Maxillary dental midline was 2mm to the left, and the chin point was ~5mm to the right.*
- Smile: *Incisal exposure was WNL, but the smile arc was unattractive.*
- Lip Competence: *Hypermentalis strain with lips closed*

Skeletal:

- Intermaxillary Relationship: *Bimaxillary protrusion (SNA 89.5°, SNB 89.5°, ANB 0°)*
- Mandibular Plane: *Increased (SN-MP 36.5°, FMA 29.5°)*
- Vertical Dimension of Occlusion (*VDO*): *Excessive (Na-ANS-Gn 57%)*
- Symmetry: *Mandible deviated to the right about 5mm*

Dental:

- Classification: *Full-cusp Class III relationship on the right*
- Overbite: *2mm*
- Overjet: *-2mm*
- Anterior Crossbite: *UR1, UR2*
- Missing/Hopeless Teeth: *LL6 was missing. LL7 and LL8 residual roots were retained.*
- Rotation: *UR4 rotated mesial in about 70°*

CEPHALOMETRIC SUMMARY			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA° (82°)	89.5°	89.5°	0°
SNB° (80°)	89.5°	88°	1.5°
ANB° (2°)	0°	1.5°	1.5°
SN-MP° (32°)	36.5°	38°	1.5°
FMA° (25°)	29.5°	31°	1.5°
DENTAL ANALYSIS			
U1 To NA mm (4 mm)	5.5	4.5	1
U1 To SN° (104°)	114.5°	113.5°	1°
L1 To NB mm (4 mm)	6.5	4	2.5
L1 To MP° (90°)	75.5°	74°	1.5°
FACIAL ANALYSIS			
E-LINE UL (-1 mm)	-2	-2	0
E-LINE LL (0 mm)	2	0.5	1.5
%FH: Na-ANS-Gn (53%)	57%	57.5%	0.5%
Convexity: G-Sn-Pg' (13°)	0°	2.5°	2.5°

Table 1: Cephalometric summary

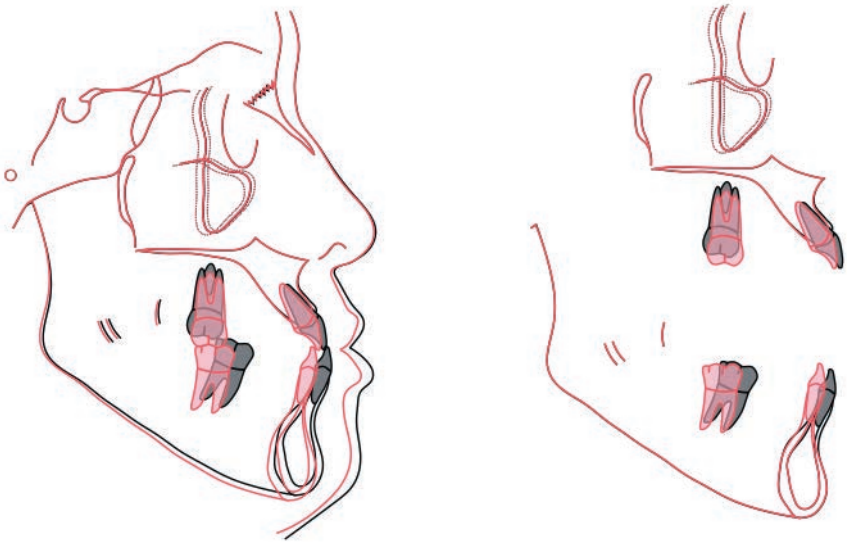

Fig. 9:
Pre- (black) and post-treatment (red) cephalometric tracings are superimposed on the anterior cranial base (left), on the maxilla (upper right), and on the stable internal structures of the mandible (lower right). Principal changes during treatment were retraction of the mandibular dentition and decreased lower lip protrusion.

The ABO Discrepancy Index (*DI*) was 25 as shown in the subsequent worksheet (*Worksheet 1*).

Treatment Objectives

The treatment objectives were:

1. Autotransplant the LR7 to the LL7 site.
2. Correct the Class III malocclusion by closing the lower right 2nd molar space.
3. Improve the facial profile and smile esthetics.

Treatment Alternatives

For skeletal asymmetry with mandibular prognathism, orthognathic surgery is often necessary to achieve a desirable result. However, the patient refused orthognathic surgery, which was previously suggested by multiple orthodontists. She preferred a more conservative treatment approach.

Plan A

First, extract the hopeless lower left molars and all wisdom teeth. Second, retract the LR buccal segment utilizing a temporary anchorage device (*TAD*) in the right mandibular buccal shelf area. Third, perform endodontic treatment and occlusal reduction for the over-erupted UL5-UL6. Fourth, place dental implants in lower left molar region and fabricate prostheses (*crowns*) to restore UL5 and UL6 (*Fig. 10*).

Plan B

Use infra-zygomatic crest (*IZC*) and palatal screws to intrude the upper left posterior segment. Autotransplant the endodontically treated LR7 to the LL7 extraction site. Correct the Class III molar relationship on the right by closing the LR7 extraction space. Finally, construct a fixed dental prothesis to restore the missing LL6 (*Fig. 10*).

The patient preferred Plan B because she perceived that it was the most cost-effective and conservative approach for a near-ideal result.

Appliances and Treatment Progress

The first priority was to achieve sufficient interocclusal space for the autotransplantation of the LR7 in the LL7 extraction site (*Fig. 10*). Two 2x8-mm stainless steel (*SS*) bone screws were installed between UL5 and UL6 on the buccal and palatal surfaces respectively. Six months later, the UL5 and UL6 were significantly intruded (*Fig. 11*).

Before orthodontic treatment, the patient received a cone-beam computed tomography (*CBCT*) examination to analyze the donor tooth (*LR7*) and recipient site (*LL7*). The shape and dimensions of the recipient site were compared to 3D measurements of the donor tooth to confirm compatibility. After a careful assessment, the LR7 was selected as the most appropriate donor tooth. A 3D replica of the LR7 was fabricated with a 3D printer after segmentation of the DICOM file.[1]

Pulp revascularization is not expected for a fully developed donor tooth, so presurgical endodontics was indicated. After completion of the endodontics on the LR7, occlusal reduction and fixation grooves were prepared. After flap elevation, the LL7 residual

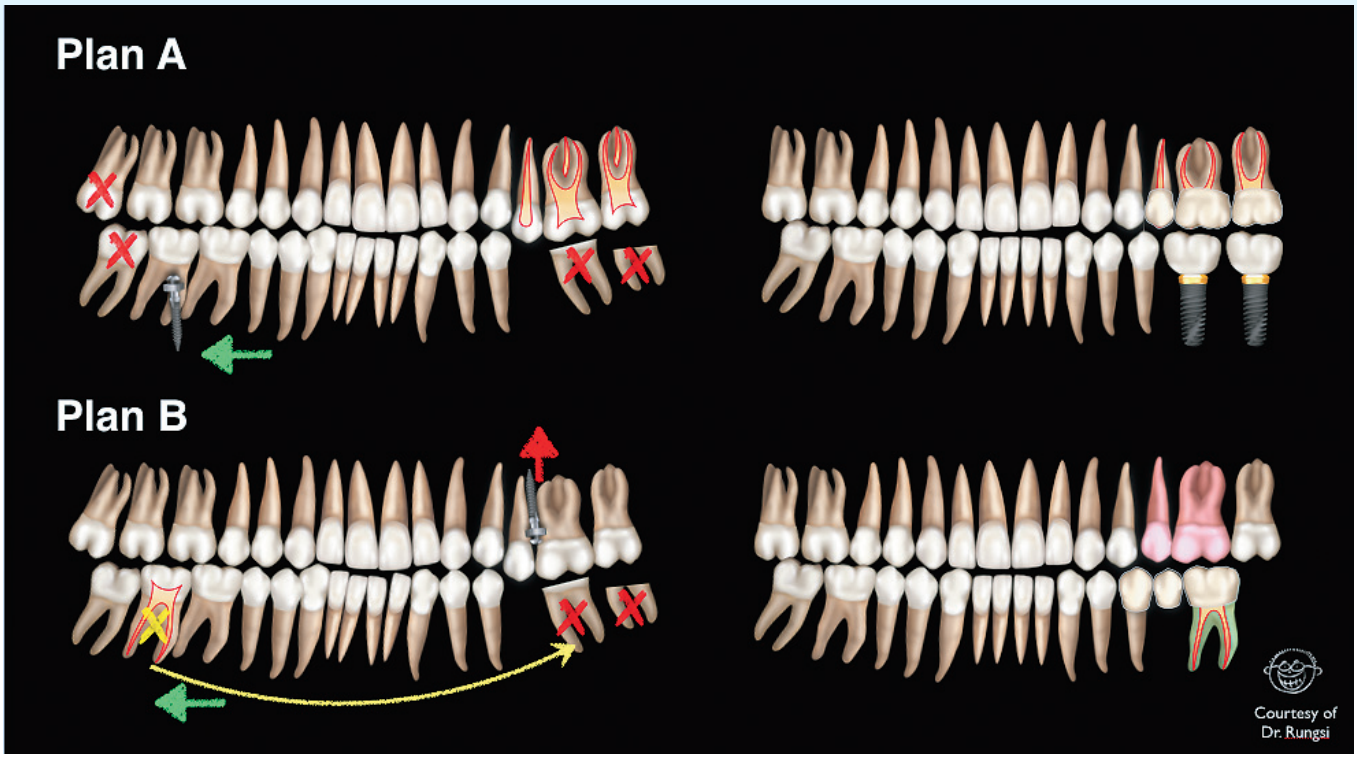

Fig. 10: Diagrams of the two treatment options: Plans A and B. See text for details.

Fig. 11:
Progress photographs for the intrusion of the UL5 and UL6 show power chains anchored by 2x8-mm mini-screws that deliver intrusive force on the buccal and lingual surfaces. Note after 6 months (6M) of treatment, there was adequate interocclusal space created for autotransplantation into the LL7 site.

roots were removed, and the sterilized 3D-printed replica was used to prepare the osseous recipient site. Bone defects on the buccal surface of the LL7 residual roots resulted in a buccal plate defect (*Fig. 12*).

The height of the distal alveolar ridge was reduced with a chisel to establish optimal bone architecture. Then, the donor tooth was carefully extracted by using a dental forceps. The roots of the donor tooth were coated with enamel matrix derivative (*Emdogain®*)[2] (*EMD*), and the LR7 was inserted into the LL7 recipient site. The buccal osseous defect was grafted with freeze-dried bone allograft (*FDBA*). The flap was repositioned, soft tissue was sutured, and the transplanted tooth was stabilized using horizontal cross mattress sutures (*Fig. 13*). This non-rigid form of fixation was maintained for 2 weeks.[3,4] One month after surgery, the transplanted tooth was well healed. There were no symptoms nor evidence of root resorption.

A 0.022" slot passive self-ligating (*PSL*) bracket system, Damon Q® (*Ormco, Brea, CA*), was selected. Standard torque brackets were bonded on the upper incisors, and low torque brackets were bonded inversely (*upside down*) on the lower incisors.[5] The initial archwires were 0.013" CuNiTi wire in the upper and 0.014" CuNiTi in the lower. A tie back ligature was placed between the LR6 and LR8 to prevent dislodging of the wire. One week

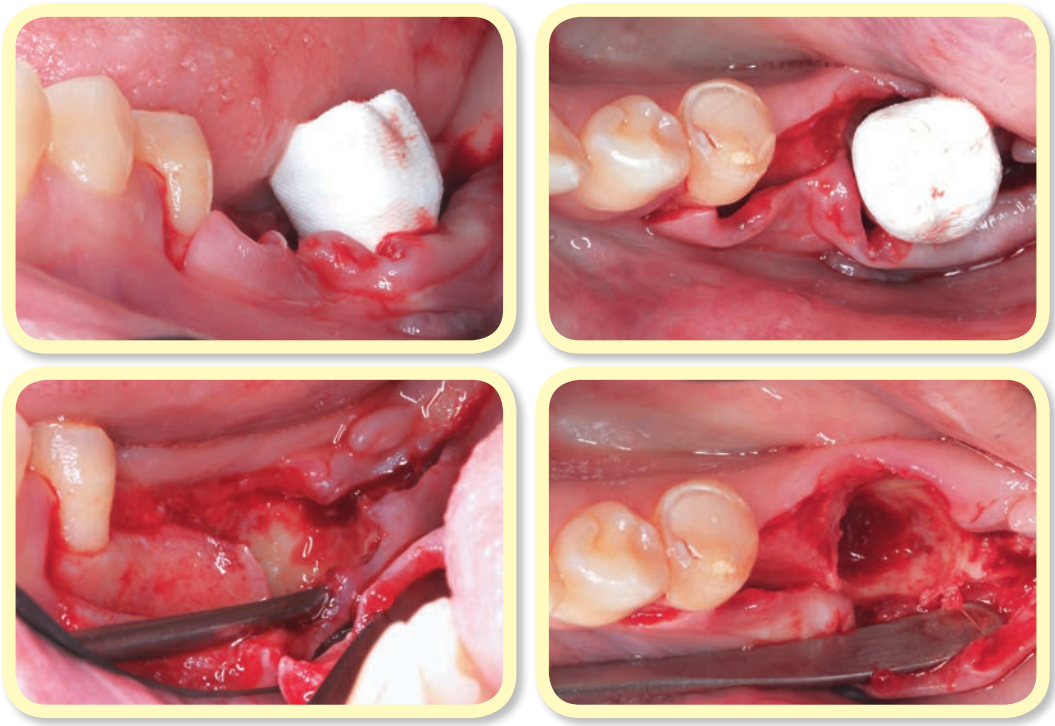

Fig. 12:
A 3D-printed replica was used to prepare the osseous contours of the recipient site (upper left and right). A lack of buccal bone was noted after recipient site preparation (lower left and right).

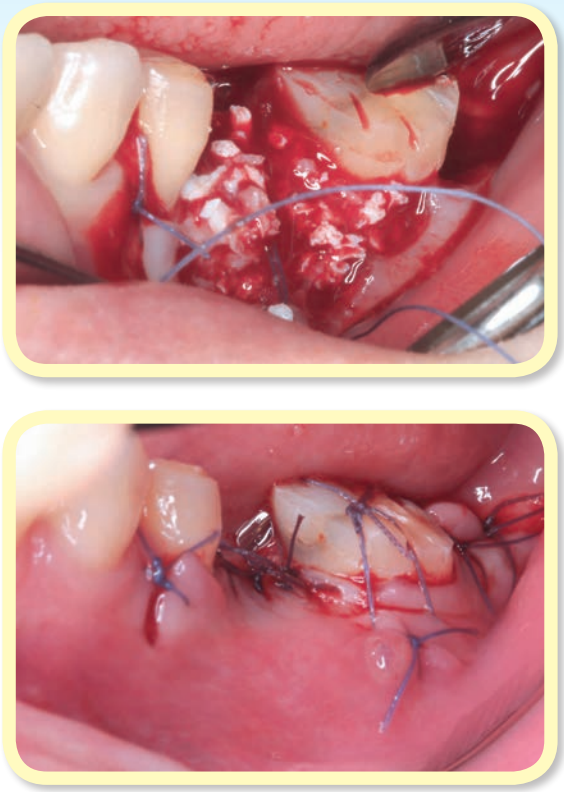

Fig. 13:
The donor tooth was transplanted, and the buccal osseous defect was grafted. See text for details.

later, a 2x8-mm bone screw was placed mesial to the autotransplanted tooth. A chain of elastics was applied from the LL3 to the LR mini-screw to correct the lower midline deviation.

One month into active treatment, buccal and lingual elastic chains were applied to correct the severe mesial-in rotation of UR4 (*Fig. 14*).[6] At the same time, an open coil spring was utilized between the UR3 and UR5 to increase space to assist with negative overjet correction. Two months later, the rotation and anterior cross bite were sufficiently corrected, so the UR4 was bonded with a bracket, and a 0.013" CuNiTi super archwire was engaged.

At the 5th month of treatment, an orthodontic band with an attached bracket was cemented on the autotransplanted tooth to prevent it from fracturing. Meanwhile, both upper and lower arch wires were changed to 0.014x0.025" CuNiTi to improve alignment.

Seven months into treatment, both archwires were changed to 0.018x0.025" CuNiTi. An open coil spring was placed between LL5 and LL7 to retract and upright the LL7. By the 9th month of treatment, there was no further movement of LL7. Ankylosis was suspected, and subsequently confirmed radiographically (*Fig. 15*). Twelve months into treatment, the extraction space of LR7 was closed. Both archwires were replaced with 0.016" CuNiTi. Up and down vertical elastics (*Fox, 1/4", 3.5oz*) were applied to settle the occlusion.

In the 15th month of treatment, torquing springs were used to correct the lingually inclined lower incisors, and both archwires were changed to

Fig. 14:
The UR4 is rotated distal in by increasing the space in the arch and applying a rotating force with a couple applied on the buccal and lingual surfaces. See text for details.

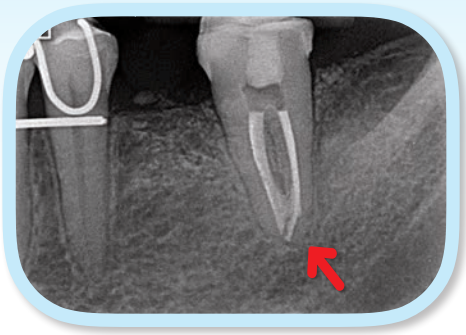

Fig. 15:
The transplanted tooth appears to be ankylosed in the apical region (red arrow). See text for details.

0.018x0.025" CuNiTi. By the 20th month of treatment, interproximal reduction was performed on the lower incisors to correct dark triangles. In the 23rd month of treatment, Class II elastics (*Fox, 1/4", 3.5oz*) were used to finish the anterior overjet. After 25 months of active treatment, all fixed appliances were removed.

Treatment Results

The patient was treated to the desired result as documented in Figs. 4-6. Substantial improvement was achieved in facial esthetics, dental alignment, and intermaxillary occlusion. No periodontal problems were noted.

The post-treatment panoramic radiograph documented acceptable root parallelism, except for the LR segment. The roots of both the LR5 and LR6 were oriented mesially (*Fig. 8*). Superimposed cephalometric tracings revealed that the entire mandibular arch was retracted about 4mm, which showed the effectiveness of Class III elastics combined with buccal shelf mini-screw anchorage to intrude the UR posterior segment. The axial inclination of the upper incisor was decreased by 1° (*U1-SN: PRE-Tx 114.5°, POST-Tx 113.5°*), and the axial inclination of the lower incisors was well maintained despite considerable retraction (*L1-MP: PRE-Tx 75.5°, POST-Tx 74°*). Bite opening associated with autotransplantation of the LR7 to LL7 increased the mandibular plane angle 1.5° (*SN-MP: PRE-Tx 36.5°, POST-Tx 38°*), which assisted the anterior crossbite correction. The patient was well satisfied with the result.

The ABO CRE score was 22 points, as shown in the supplementary CRE worksheet (*Worksheet 2*).[7] The residual deficits were overall tooth alignment and lingual inclination of some posterior teeth. The Pink & White dental esthetic score was 7 points (*Worksheet 3*).[8]

Retention

Hawley retainers were delivered for each arch. The patient was instructed to wear them full time for the first month and nights only thereafter. Instructions were provided for home hygiene as well as for maintenance of the retainers.

Discussion

1. Molar Intrusion

Over-extrusion of the left maxillary posterior segment was due to the loss of mandibular antagonists. Unilateral dental extrusion into an edentulous space may be associated with functional disturbances and occlusal interferences, which may complicate restoration with orthodontic and/

or prosthetic procedures. Conventional options for correcting the problem include: 1) coronal reduction of a molar crown(*s*), which may require root canal therapy and full coverage restoration; 2) posterior sub-apical osteotomy, an orthognathic surgical procedure and an expensive option that entails the risk of general anesthesia and molar devitalization; and 3) orthodontic intrusion of maxillary molars. The third option is the most conservative approach, but a desired result is difficult to achieve with only labial intrusive force because the teeth tip buccally and palatal cusps may interfere with occlusion.

Conventional techniques for intrusion require anchorage reinforcement by incorporating multiple teeth in the anchorage segment and/or the use of extraoral devices. The latter typically requires elastics so patient cooperation is an important factor. Routine orthodontic mechanics may extrude the anchorage rather than intrude the extruded tooth. Preventing extrusion of an anchorage tooth or segment is a critical factor for achieving desirable dental intrusion. Skeletal anchorage devices include dental implants, surgical mini-plates, and mini-screws. Temporary anchorage devices (*TADs*) are increasingly popular anchorage for intrusion. The TADs for the present patient were two mini-screws placed between the UL5 and UL6 on buccal and palatal surfaces, respectively. To prevent root resorption, intrusive force levels were kept relatively low, but an optimal force is yet to be established for dental intrusion with mini-screws.[9]

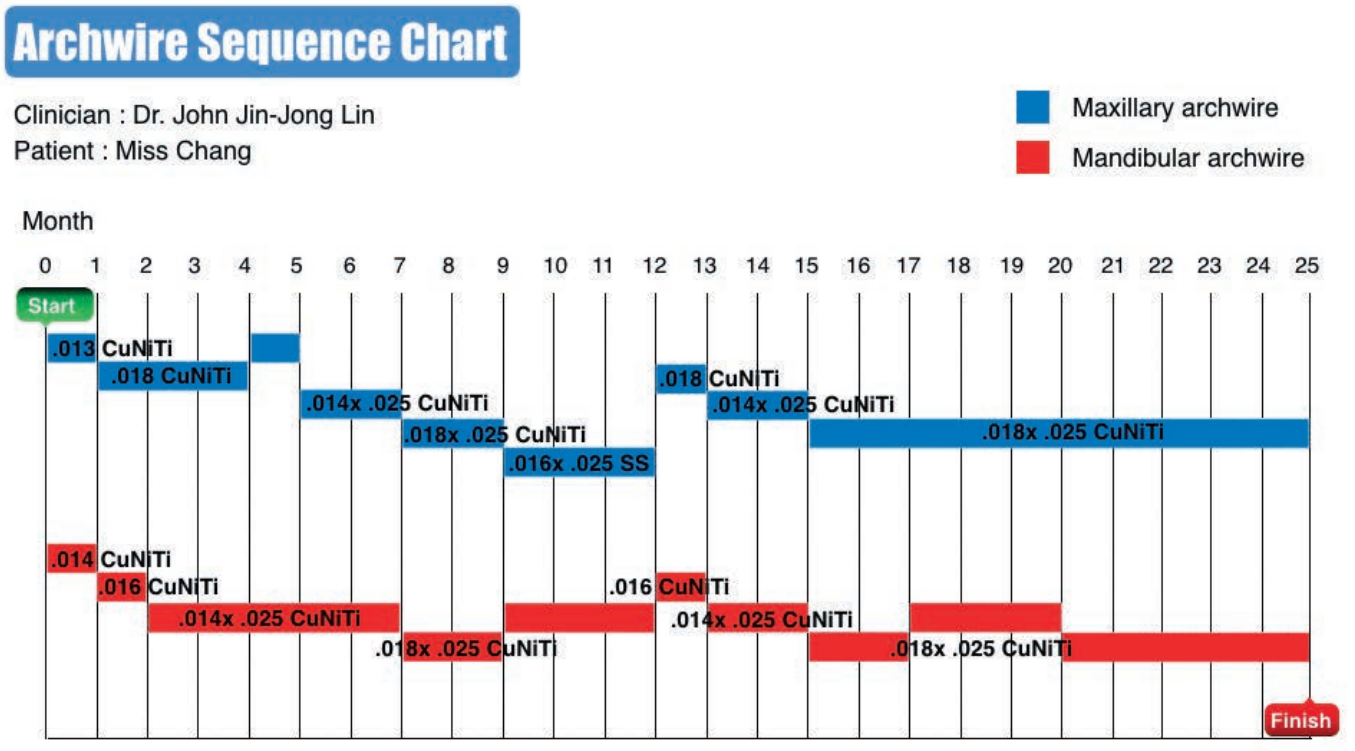

Fig. 16: Archwire sequence chart

2. Space Closure

The LR7 extraction provided the space needed to correct the negative overjet and to improve buccal intercuspation. Elastomeric chains on both the buccal and lingual surfaces enhance the efficiency of space closure and help control side effects. For instance, applying force only on the buccal surface usually results in distal-out rotation of the terminal molar in the anchorage unit and increases the Curve of Spee (*posterior openbite*).[10] Another concern with space closure is excessive retraction of the incisors, which often results in a facial profile compromise. Torque control with incisor bracket selection and/or third order adjustment of archwires is an important factor.

3. Autotransplantation

Autogenous tooth transplantation refers to surgical repositioning of a tooth (*teeth*) in the same patient. Assuming a suitable donor tooth is available, this procedure may be helpful for managing spaces due to congenitally missing teeth, ectopic eruption, severe caries, periodontal disease, trauma, or endodontic failure.[11,12]

The survival rate for tooth autotransplantation ranges from 81-90%.[13] Reattachment of soft tissue to the root surface occurs within 2 weeks,[4] but complete healing as evidenced by a radiographically evident PDL space and lamina dura around the root requires about 8 weeks.[14]

The most important criteria for the recipient site is adequate bone support to retain the transplanted tooth. There must be sufficient alveolar bone support in all dimensions with adequate attached keratinized tissue to allow for stabilization of the transplant. In addition, the recipient site should be free from acute infection and chronic inflammation.[15] For the present patient, it was necessary to remove granulation tissue from the LL7 extraction site prior to seating the transplant. Antibiotic prophylaxis (*Amoxicillin 500mg q.i.d. for 3 days*) was provided. This approach was deemed essential for autotransplantation success.

An important factor for bone formation is good cervical approximation of the transplanted tooth to the bone of the recipient area. If cervical approximation is adequate, most tooth roots heal as a closed wound so there is lower chance of infection. The LR7 was the best fit for the donor site as confirmed by the surgical fit of the replica (*Fig. 12*).

Maintaining vitality of the PDL is an important goal during transplant surgery because a traumatized root surface is often associated with ankylosis.[16,17] The latter is one of the common complications for tooth autotransplantation (*Fig. 15*). This phenomenon is probably due to the periodontal ligament (*PDL*) damage that is inherent in the tooth transplantation process. PDL damage is probable for long (*14mm*), completely formed roots. Adjacent osseous tissue attaches to the tooth root in the absence of a well-formed PDL. If the position of an ankylosed tooth is acceptable, normal function can be expected for a long period of time. However, the affected tooth

cannot adjust to changes in dentofacial relationships with physiologic tooth movement, so occlusal modification is not indicated.

Severe root resorption is the most common cause of transplant failure. During autogenous tooth transplantation, extraoral endodontic treatment prolongs the extraoral transplant time which can result in loss of vitality of PDL, Hertwig's epithelial root sheath, and root cementum.[18] All of these factors may contribute to progressive root resorption.

To reduce the extraoral time, the endodontic treatment was performed before extracting and transplanting the tooth. Vitality of the PDL is important for transplant success.[19] The PDL is sensitive to changes in pH and osmotic potential, so its viability is reduced by extended extraoral "*dry time*" prior to transplantation.[20]

In comparison to implants, rapid bone induction around a transplanted tooth is a significant advantage. This anabolic osseous response generates new bone around the transplant which is observed radiographically as rapid bone regeneration and delineation of a lamina dura.[4]

Conclusions

A pleasing result for a challenging Class III malocclusion was achieved in 25 months without orthognathic surgery. With a thorough diagnosis and meticulous treatment plan, autogenous transplantation is a viable treatment modality for many partially edentulous patients, particularly if extractions are needed. Patient selection involves a careful 3D evaluation of the proposed donor tooth and the recipient site. Success depends on treatment planning, surgical skill, and good patient compliance. A sterilized 3D replica of the donor tooth is helpful for the osseous preparation of the recipient site.

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Discrepancy Index Worksheet

TOTAL D.I. SCORE 25

OVERJET

0 mm. (edge-to-edge)	=	
1 – 3 mm.	=	0 pts.
3.1 – 5 mm.	=	2 pts.
5.1 – 7 mm.	=	3 pts.
7.1 – 9 mm.	=	4 pts.
> 9 mm.	=	5 pts.

Negative OJ (x-bite) 1 pt. per mm. per tooth = 4

Total = 4

OVERBITE

0 – 3 mm.	=	0 pts.
3.1 – 5 mm.	=	2 pts.
5.1 – 7 mm.	=	3 pts.
Impinging (100%)	=	5 pts.

Total = 0

ANTERIOR OPEN BITE

0 mm. (edge-to-edge), 1 pt. per tooth
then 1 pt. per additional full mm. per tooth

Total = 1

LATERAL OPEN BITE

2 pts. per mm. per tooth

Total = 0

CROWDING (only one arch)

1 – 3 mm.	=	1 pt.
3.1 – 5 mm.	=	2 pts.
5.1 – 7 mm.	=	4 pts.
> 7 mm.	=	7 pts.

Total = 1

OCCLUSION

Class I to end on	=	0 pts.
End on Class II or III	=	2 pts. per side _____ pts.
Full Class II or III	=	4 pts. per side _____ pts.
Beyond Class II or III	=	1 pt. per mm. additional _____ pts.

Total = 6

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 0

BUCCAL POSTERIOR X-BITE

2 pts. per tooth Total = 2

CEPHALOMETRICS (See Instructions)

ANB ≥ 6° or ≤ -2° = 4 pts.

Each degree < -2° _____ x 1 pt. = _____

Each degree > 6° _____ x 1 pt. = _____

SN-MP

≥ 38° = 2 pts.

Each degree > 38° _____ x 2 pts. = _____

≤ 26° = 1 pt.

Each degree < 26° _____ x 1 pt. = _____

1 to MP ≥ 99° = 1 pt.

Each degree > 99° _____ x 1 pt. = _____

Total = 0

OTHER (See Instructions)

Supernumerary teeth	_____	x 1 pt. =	_____
Ankylosis of perm. teeth	_____	x 2 pts. =	_____
Anomalous morphology	_____	x 2 pts. =	_____
Impaction (except 3rd molars)	_____	x 2 pts. =	_____
Midline discrepancy (≥3mm)		@ 2 pts. =	_____
Missing teeth (except 3rd molars)	_____	x 1 pts. =	2
Missing teeth, congenital	_____	x 2 pts. =	_____
Spacing (4 or more, per arch)	_____	x 2 pts. =	_____
Spacing (Mx cent. diastema ≥ 2mm)		@ 2 pts. =	_____
Tooth transposition	_____	x 2 pts. =	_____
Skeletal asymmetry (nonsurgical tx)		@ 3 pts. =	3
Addl. treatment complexities	3	x 2 pts. =	6

Identify: Autotransplantation and UL5, UL6 intrusion.

Total = 11

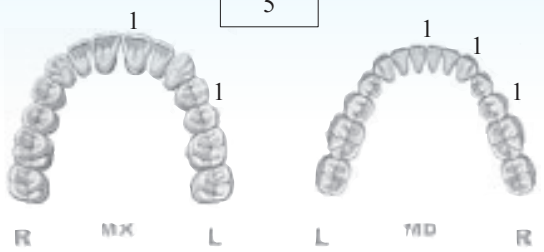
Cast-Radiograph Evaluation

Case # **Patient**

Total Score: 22

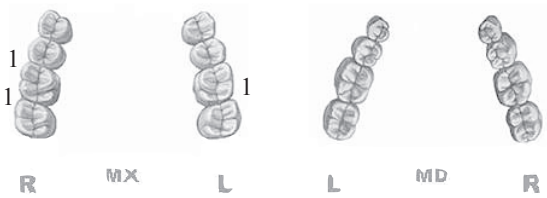
Alignment/Rotations

5



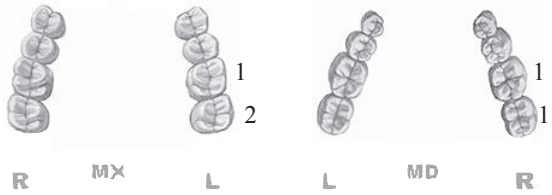
Marginal Ridges

3



Buccolingual Inclination

5

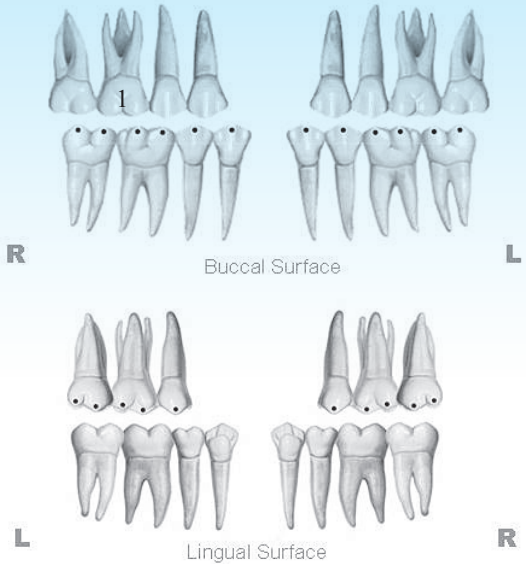


Overjet

4

Occlusal Contacts

0

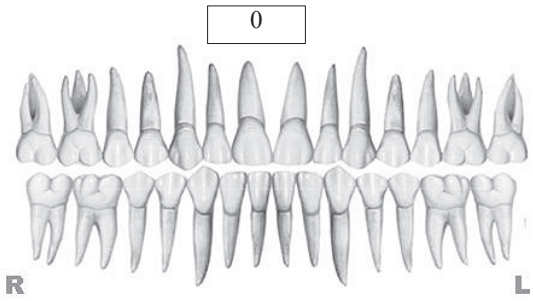


Occlusal Relationships

4

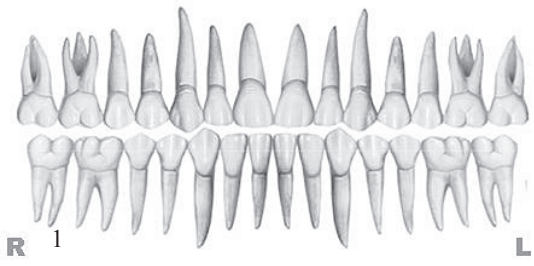
Interproximal Contacts

0



Root Angulation

1



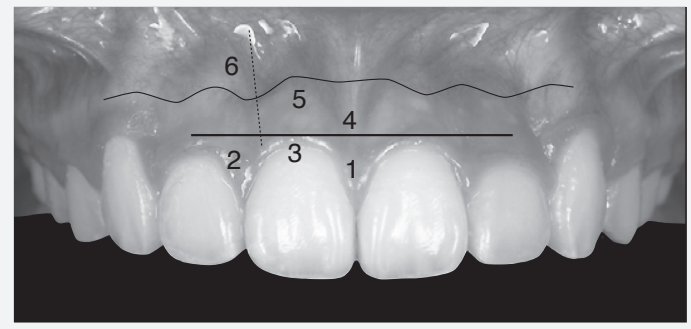
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

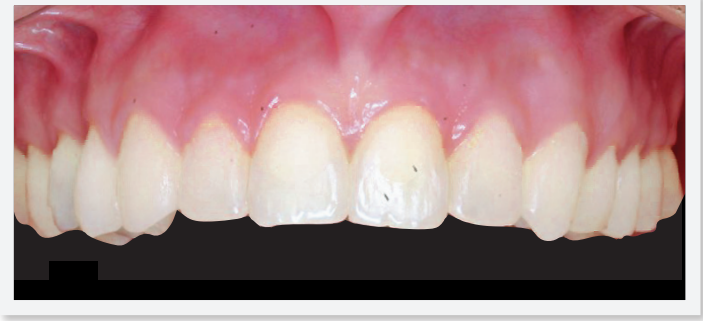
Total Score: = 7

1. Pink Esthetic Score

Total = 2



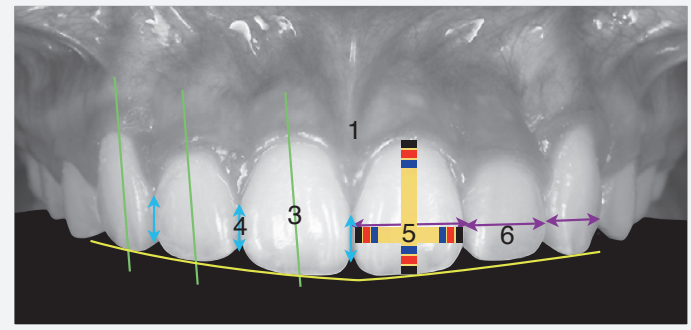
1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2



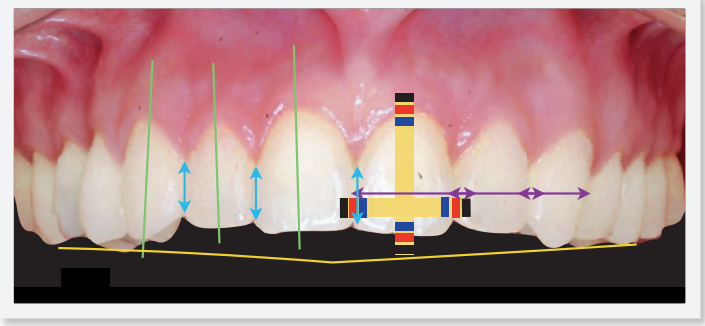
1. M & D Papilla	(0)	1	2
2. Keratinized Gingiva	(0)	1	2
3. Curvature of Gingival Margin	(0)	1	2
4. Level of Gingival Margin	0	(1)	2
5. Root Convexity (Torque)	0	(1)	2
6. Scar Formation	(0)	1	2

2. White Esthetic Score (for Micro-esthetics)

Total = 5



1. Midline	0	1	2
2. Incisor Curve	0	1	2
3. Axial Inclination (5°, 8°, 10°)	0	1	2
4. Contact Area (50%, 40%, 30%)	0	1	2
5. Tooth Proportion (1:0.8)	0	1	2
6. Tooth to Tooth Proportion	0	1	2



1. Midline	(0)	1	2
2. Incisor Curve	0	1	(2)
3. Axial Inclination (5°, 8°, 10°)	0	(1)	2
4. Contact Area (50%, 40%, 30%)	0	(1)	2
5. Tooth Proportion (1:0.8)	(0)	1	2
6. Tooth to Tooth Proportion	0	(1)	2

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2021	Session A	05/18–21	05/22
	Session B	10/07–10	10/11

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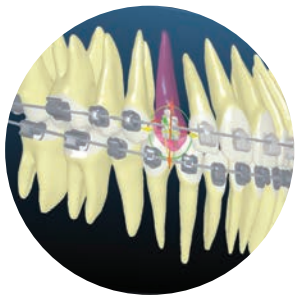

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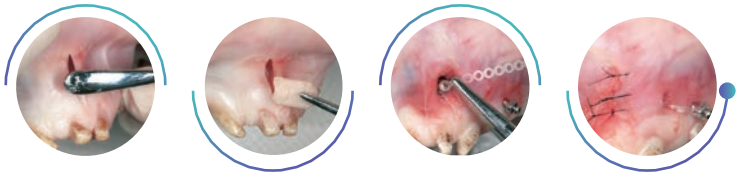

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Course Schedule

Day 1 **Chair–side observation**

Day 2 **Insignia Lecture, Chair–side observation**

Chris' Lecture:
Digital Orthodontics with TAD

Day 3 **VISTA Lecture & workshop**

Chris' Lecture:
VISTA for Impacted Cuspids

* The topics for VISTA workshop:

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2. VISTA with connective tissue graft
3. Suture technique

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Digital Orthodontics, OBS & VISTA

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by Newton's A team

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3. Basic animations and visual aids

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KEYNOTE

THE LECTURER

Dr. Chris Chang

CEO, Beethoven Orthodontic and Implant Group. He received his PhD in bone physiology and Certificate in Orthodontics from Indiana University in 1996. As publisher of Journal of Digital Orthodontics-*A journal for Interdisciplinary dental treatment*, he has been actively involved in the design and application of orthodontic bone screws.

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Surgical Procedures, Mechanics, and Problems in Recovering 51 Impacted Maxillary Canines for 46 Patients with the OBS-3D Lever Arm Appliance

Abstract

***Objective**: Assess recovery for consecutive impacted maxillary canines (I-U3s).*

***Materials and Methods:** Based on three-dimensional (3D) imaging, 51 I-U3s were recovered from 46 patients: 11 male, 35 female, mean age 16.5 years (range 10-36 yr). Orthodontics prepared a path for movement of the I-U3s as needed. Minimally invasive surgery uncovered the I-U3s and removed bone to the level of CEJ. 3D anchorage was provided with a 2mm diameter stainless steel (SS) OrthoBoneScrew® (OBS). A rectangular slot secured a custom SS wire segment (OBS-3D lever arm) to align the I-U3.*

***Results**: Impaction locations were according to side (22 right, 29 left), and surface (32 labial, 19 palatal). I-U3s were optimally aligned in an average of 11.7 months (M), but six more severe labial impactions required up to 17M, and six complete transpositions required 27-30M. Moderate root resorption (<2mm) on the adjacent lateral incisor was noted for four I-U3s (3 labial, 1 lingual). Gingival recession affected 19 recovered canines (11 labial, 8 palatal); all were moderate (Miller Class I) except for one severe problem (Miller Class III).*

***Conclusions**: The OBS-3D lever arm is a biomechanic system that enhances the probability of success by controlling treatment duration and complications. Root resorption on adjacent lateral incisors is best avoided by not bonding a bracket on them during the recovery process. (J Digital Orthod 2020;59:24-33)*

Key words:
Maxillary canine, impaction, transposition, bone screw, 3D lever arm, gingival recession, root resorption

Introduction

Dental nomenclature for this report is a modified Palmer notation, i.e. quadrants are upper right (*UR*), upper left (*UL*), lower right (*LR*) and lower left (*LL*), and permanent teeth in each quadrant are numbered 1 to 8 from the midline. In 1975, Archer[1] defined an impacted tooth as completely or partially unerupted with an unfavorable position relative to an obstacle (*tooth, bone, or soft tissue*) that probably prevented eruption. With the exception of third molars, maxillary permanent canines (*U3s*) are the most common impactions. There is a variable prevalence among ethnic groups from 0.27% in Japanese[2] to as much as 2.4% in Italians.[3] Females are 2-3 times more frequently affected than males.[3-6] Early diagnosis and treatment is recommended to avoid severe displacement and complete transposition.[5,6] Abnormal position and/or lack of a canine eminence between age 8-10 years are early signs of potential impaction.[7]

Closed eruption and an apically positioned flap are viable approaches,[5,6] but using an archwire as anchorage can result in distortion of the arch,

Chris H. Chang,
Founder, Beethoven Orthodontic Center
Publisher, Journal of Digital Orthodontics (Left)

Eric Hsu,
Lecturer, Beethoven Orthodontic Course (Center)

W. Eugene Roberts,
Editor-in-Chief, Journal of Digital Orthodontics (Right)

particularly if the canine is or becomes ankylosed.[8] A stainless steel (*SS*) endosseous OrthoBoneScrew® (*OBS*) (*iNewton, Inc., Hsinchu City, Taiwan*) has a rectangular hole (*tube*) to receive a 0.019x0.025-in SS wire (*OBS 3D lever-arm*) (*Fig. 1*). The purpose of this study was to assess the OBS 3D lever arm appliance relative to treatment time, success rate, and complications for a consecutive series of impacted upper canines (*I-U3s*).

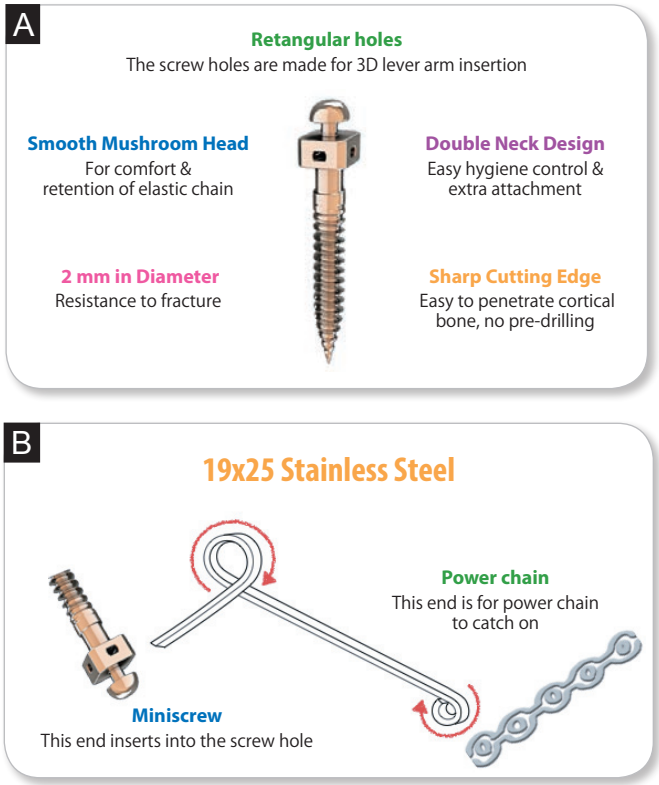

Fig. 1:

A. A 2x14-mm SS bone screw has a rectangular hole (tube) designed to insert a 3D lever arm.

B. A 3D lever arm is formed from a 0.019x0.025-in SS wire as shown.

Material and Methods

The Institutional Review Board (*IRB*) of Taiwan Medical Research Ethics Foundation (*protocol number: MIC1/19-S-004-1*) approved this retrospective study that resulted in 46 consecutive patients with 51 I-U3s. They were treated from 2013-2016 and were all evaluated with cone-beam computed tomography (*CBCT*) (*Fig. 2*). The OBS 3D lever arm appliance (*Fig. 3*) was used for all patients, but the

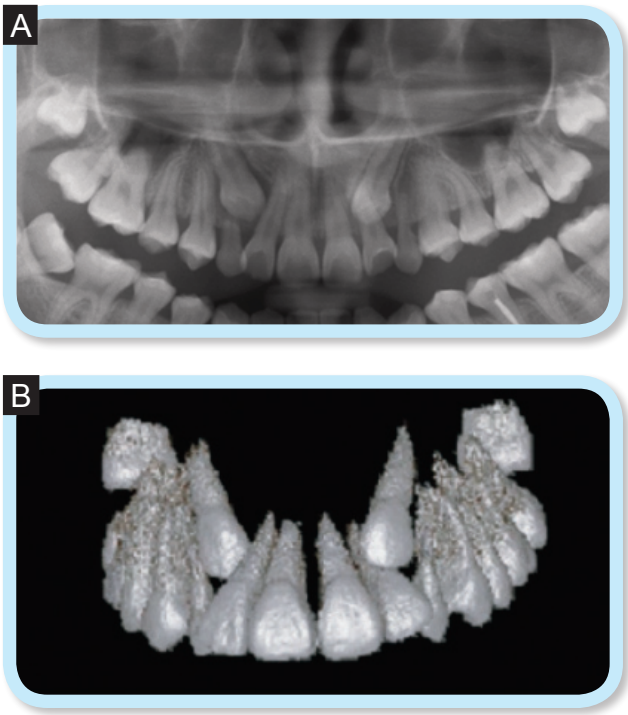

Fig. 2:

A. A panoramic radiograph is a 2D image that is unreliable for determining the relationship of impactions to the roots of adjacent teeth.

B. A CBCT image shows important details in 3D for locating, uncovering, and applying mechanics to recover I-U3s.

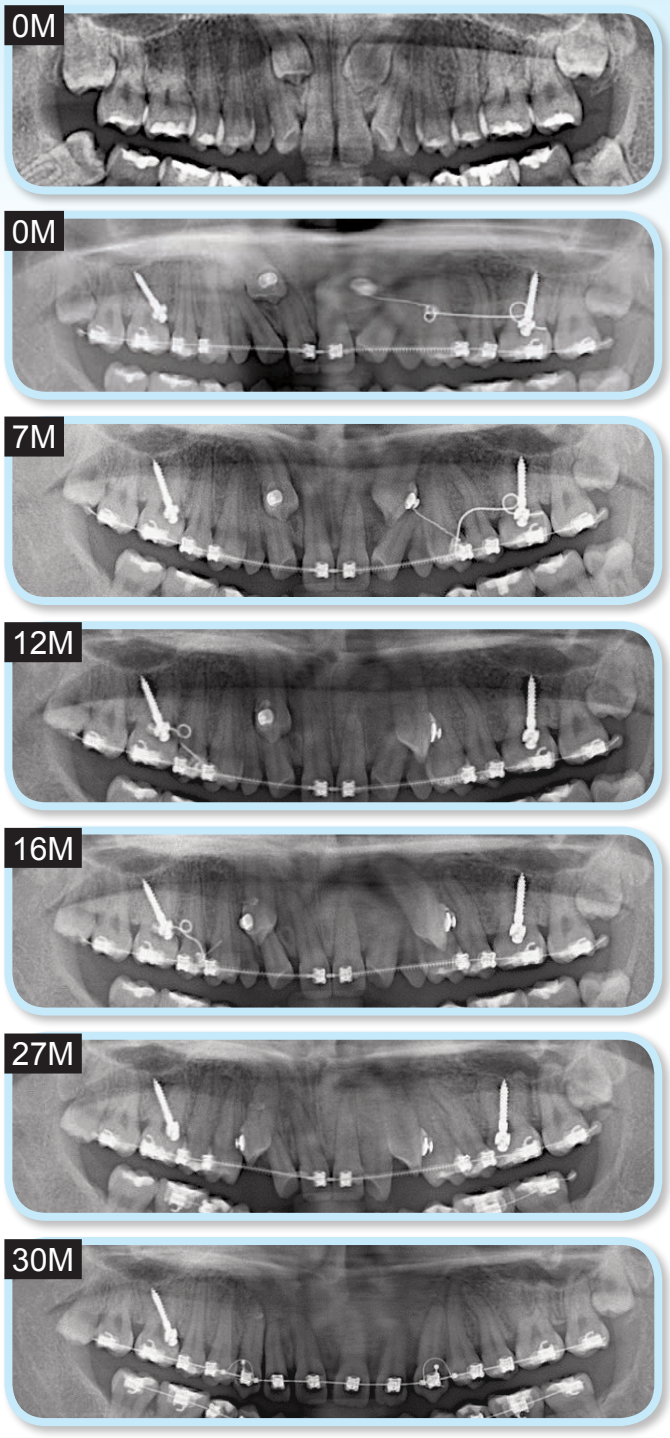

Fig. 3:
A vertical panel of progressive panoramic radiographs documents the recovery of I-U3s from the upper pretreatment image (0M) and the immediate post-operative view (second 0M) to the completion of active treatment at thirty months (30M). Note there are no brackets bonded on the maxillary lateral incisors until after 27 months (27M) to avoid root resorption. See text for details.

surgical exposure varied depending on the location and orientation of the impaction. Pretreatment consultation included a thorough discussion of potential problems such as swelling, temporary facial disfigurement (*Fig. 4*), and root resorption (*Fig. 5*).

Palatal impactions were managed conventionally,[6] but labial impactions were exposed with the vertical incision subperiosteal tunnel access (*VISTA*).[9] The crown of an endosseous I-U3 was located with a surgical explorer.[10] After the crown was exposed, an eyelet was bonded at least 2mm occlusal to the cementoenamel junction (*CEJ*),[11] and all overlying bone was carefully removed to the level of the CEJ (*Fig. 6*).[12] At the planned location on the infra-zygomatic crest (*IZC*), a 2x14-mm OBS was installed with the desired orientation of the rectangular tube (*Figs. 1b and 3*). The custom lever arm was activated in the prepared plane[13] with a power chain from the

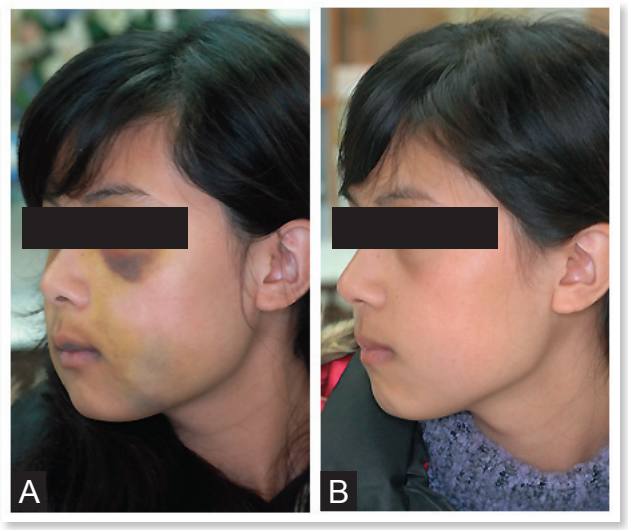

Fig. 4:
A. A postoperative complication is shown after a complex surgical intervention to initiate recovery of a transposed I-U3. Note the lip, cheek, and orbital swelling with discoloration one week post-operatively. No additional treatment was indicated.
B. One week later, the complications were almost resolved.

impaction to the distal end of the 3D lever arm and both ends were retained with polymerized resin. After activation, the soft tissue flap was closed, and a post-operative panoramic radiograph was exposed (*Fig. 3*). Details for the surgical and mechanical procedures are published.[14-17] All clinical procedures for the current sample were performed by the senior author.

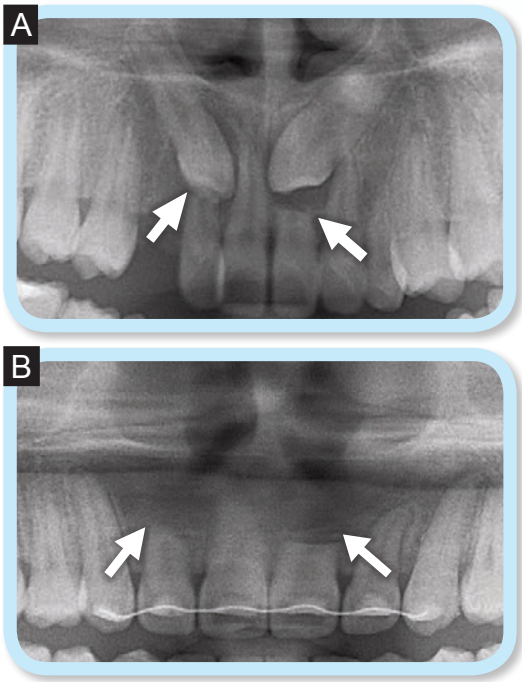

Fig. 5:

A. Pre-treatment radiography shows that I-U3s are associated with extensive root resorption (white arrows) on the UR2 and UL1.

B. Post-treatment radiography reveals that the root resorption is arrested but the loss of root structure is permanent (white arrows).

Results

From 2013-2016, 46 consecutive patients (*11 male, 35 female, mean age 16.5yr, range 10-36yr*) presented with 51 impacted maxillary canines: 41 unilateral, 5 bilateral; 22 right side, 29 left side; and 32 labial, 19 palatal. Surgery was uneventful for all patients except one who sustained facial bruises and swelling that resolved in 7 days (*Fig. 4*). All 51 I-U3s were successfully recovered and optimally aligned in occlusion. Treatment time after the initial alignment of the I-U3 was a mean of 11.7M (*Fig. 7*), but the more difficult problems like labial impactions with complete transposition required up to 37M of comprehensive treatment. Four I-U3 patients (*3 labial, 1 palatal*) experienced mild root resorption (*<2mm*) on the adjacent lateral incisor. Gingival recession occurred on 19 canines (11 labial and 8 palatal impactions); all were modest (*Miller Class I*),[16] but one was a Miller Class III (*Fig. 8*).

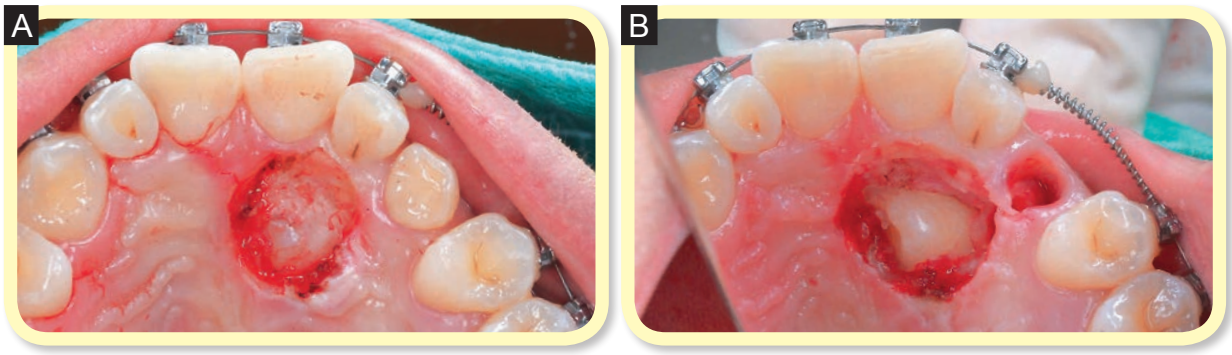

Fig. 6:

A. The crown of an impacted canine is evident after the overlying soft tissue is removed.

B. All bone was carefully removed down to the CEJ in the path of expected tooth movement.

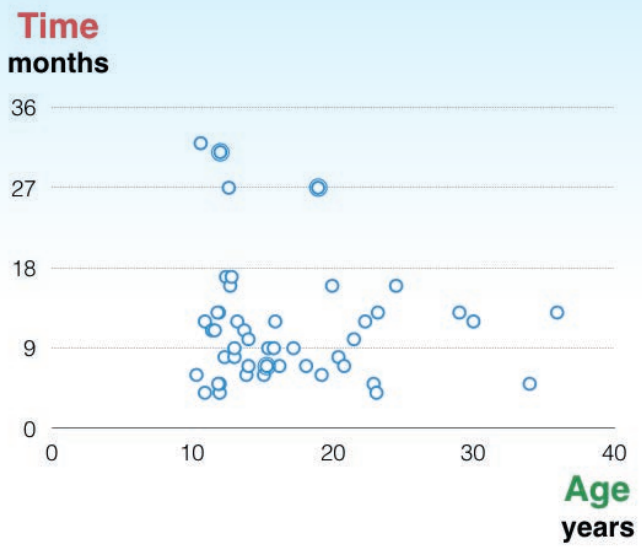

Fig. 7:
Treatment time in months after the bracket is bonded in the ideal position or on a previously impacted U3 is plotted relative to the age of the patient. See text to details.

Discussion

Recovering complex I-U3s may be associated with migration of neighboring teeth, loss of arch length, dentigerous cysts, and external root resorption of the impaction or neighboring teeth (*Fig. 5*).[6,8,12] Extracting I-U3s presents another array of undesirable outcomes such as asymmetry, lack of desired canine function, occlusal interference, eccentric mandibular closure, temporomandibular joint disorder, compromised dental esthetics, and/or unstable dental alignment.[6,8,10-12] The OBS-3D lever arm method was designed to simplify the mechanics and limit undesirable outcomes.[13] IZC OBSs are reliable fixtures (*failure rate ~7%*),[17] and case reports have established the principles for OBS-3D lever arm mechanics, but the performance of the method for a series of complex I-U3s is unknown.

Intuitively, more rapid I-U3 recovery is expected in younger patients,[18] but the current study revealed that the average treatment time (*11.7 months*) was similar for children and adults (*Fig. 7*). In contrast to a previous report with a smaller sample (*n=30*) of primarily palatal impactions,[18] the current study found that the position of the I-U3 was the prime determinant for duration of treatment. The current sample (*n=51*) was primarily labial impactions (*32*), which are usually more difficult than palatal impactions and are prone to complications,[5,6,8,10-12] particularly for a transposition.[19-22-24] Patients with complete transpositions were consistently more difficult to treat, and required extended treatment duration (*>17 months*) (*Fig. 7*).

Most prevalence studies report about two-thirds of I-U3 are palatal.[20] However, I-U3s in Chinese are two-thirds labial (*facial*), which probably reflects a high prevalence for midface deficiency.[21] In 1995, Peck[22] reported an international sample of transposed I-U3s as: 1) first premolar 71%, 2) lateral incisor 20%, and 3) all other teeth 9%. Tooth transposition is almost always in the maxilla, and it affects ~0.4%[24] of the population worldwide, but the anomaly is more common in Europeans (*2%*)[25] and Chinese (*0.81%*).[21] In comparison, 67% of the current Taiwanese sample (*n=51*) showed multiple types of I-U3 transposition: coronal (*21*), radicular (*2*), and complete (*11*).[23] Transposition with the lateral incisor (*17*) was the most common,[24] but 12 involved both the central and lateral incisors, and 5 were transposed with the first premolar. The high prevalence of difficult I-U3 transpositions suggests preferential referral to the senior author's clinic.

Complications associated with the surgically-assisted I-U3 recovery include gingival recession,[26] ankylosis,[8,27] root resorption,[28] and poor control

of axial inclination.[6,18] Inadequate torque control is a common problem when an I-U3 is aligned. Bracket torque selection is helpful, but torquing auxiliaries are commonly required. One of the more refractory complications is the control of soft tissue inflammation.[20,26,27] Oral hygiene is very difficult particularly for patients with high impactions and unfavorable soft tissue contours (*Fig. 8*). Plaque accumulation produces inflammation and the soreness discourages effective hygiene. Persistent inflammation results in gingival recession. In addition, the problem may be associated with positioning the eyelet too near the CEJ (*Fig. 8*). Moderate recession can usually be restored with periodontal surgery, but severe recession and loss of labial bone threatens the long-term outcome for a recovered canine.[26,27] The only patient in the present series with severe gingival recession (*Miller Class III*)[16] was a labial impaction with massive loss of buccal bone. The recession was noted at the time the impacted tooth was surgically uncovered (*Fig. 8*). Despite severe gingival recession at the end of treatment, the affected U3 was well aligned and functioned normally, but soft tissue correction[9] may be necessary in the future.

Root resorption associated with U3 impactions in Asians has a high incidence, up to 49.5%.[28] The adjacent lateral incisor root is the most commonly affected tooth (*Fig. 9*).[29] In comparison,

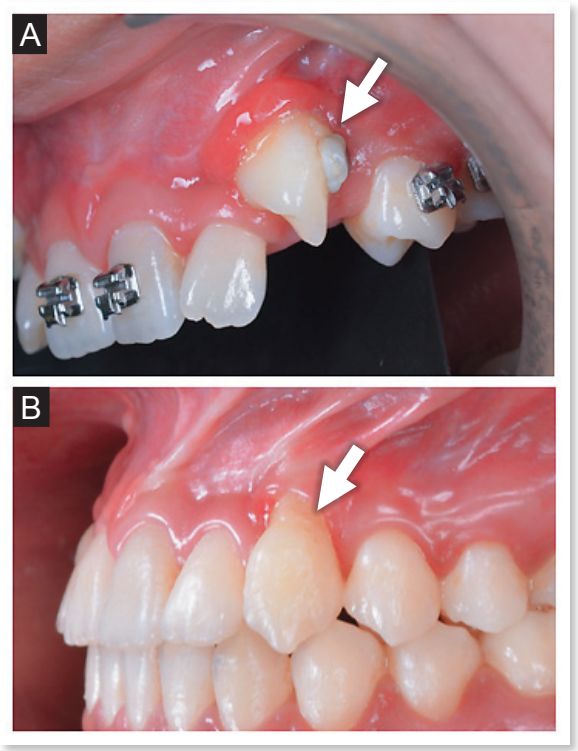

Fig. 8:

A. Plaque accumulation leads to inflammation (red) of the marginal gingiva particularly near an attachment (white arrow).

B. Gingival recession (white arrow) is noted on the labial surface of the UL3. See text for details.

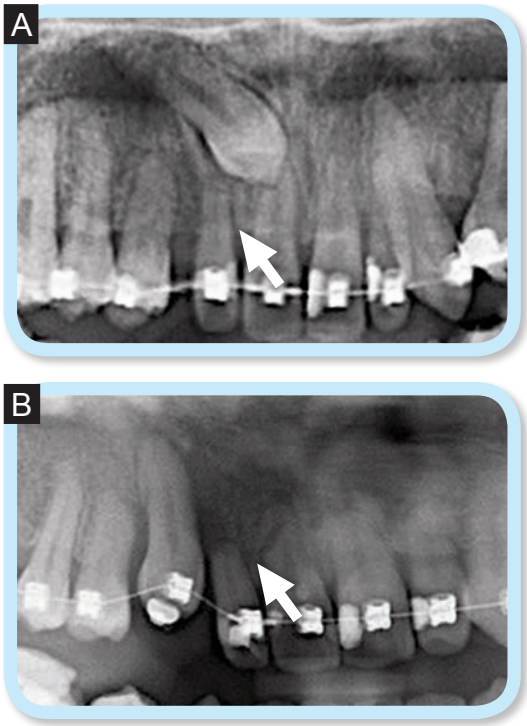

Fig. 9:

A. UR1 and UR2 (white arrow) are bonded with brackets and engaged on the archwire.

B. Severe root resorption (white arrow) is noted on the UR1 and UR2 after the impacted UR3 is retracted and extruded into the arch. See text for details.

the prevalence of lateral incisor resorption for the present sample was much lower (*4/51 or 7.8%*). This positive outcome was associated with not engaging a tooth near an impaction on the archwire (*Fig. 3*), so the root is free to move out of the way as the impaction is recovered.[24] Once the canine is properly positioned in the arch, then a full fixed appliance is indicated to achieve final alignment.

Retention is often a difficult problem for recovered impactions because of a relapse tendency due to stretched gingival supracrestal fibers.[30] Supracrestal fiberotomy[31] and a bonded fixed retainer are recommended for reliable retention.

Conclusions

Surgically assisted recovery of I-U3s with a OBS-3D lever arm is a reliable procedure with few complications. CBCT imaging is used for prospectively planning minimally invasive surgery and applied mechanics. Careful removal of bone to the level of the CEJ is required prior to applying traction. Progress should be carefully monitored radiographically. Retention is best accomplished with supracrestal fiberotomy followed by a fixed retainer.

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Case No.	Sex	Side R or L	Facial (F) or Palatal (P)	Time (month)	Age atsurgery	Transpose with	Complications
1	F	L	F	11	13Y7M		gingiva recession I
2	F	R	F	32	10Y6M	4	
3	F	R	F	27	12Y6M	1, 2	gingiva recession I
4	F	L	F	12	22Y3M	4, 5	gingiva recession I
5	F	R	P	16	19Y9M	1, 2	
6	F	R	F	8	12Y3M	2	
7	F	R	P	8	13Y	2	
8	F	R	P	12	13Y2M	1, 2	
9	F	R	P	10	21Y5M	2	
10	F	R	P	7	18Y1M	2	
11	F	L	F	13	11Y1M	1, 2	
		R	F	5	11Y1M	2	UL1, UR2 root resorption (origin, not iatrogenic)
12	F	R	F	4	11Y11M		
13	F	L	F	9	15Y8M		
14	F	L	F	12	10Y9M	2	
15	F	L	P	12	15Y9		
16	F	L	F	27	18Y10M	2	oozing left side gingiva recession I
		R	F	27	18Y10M	2	
17	F	R	P	13	29Y	1, 2	gingiva recession I lateral incisor root resorption
18	F	L	P	6	15Y1M	2	gingiva recession I
19	F	L	F	7	14Y	2	gingiva recession I
		R	F	10	14Y	2	
20	F	R	P	11	11Y4M	1, 2	gingiva recession I
21	F	R	P	5	11Y9M	2	
22	F	L	F	9	17Y2M	1, 2	lateral incisor root resorption
23	F	L	F	5	22Y9M		gingiva recession I
24	F	L	F	9	15Y4M	2	gingiva recession I
25	F	R	F	13	11Y8M	2	

■ *Table 1A. (continued on the next page)*

51 maxillary impactions in 46 patients are classified according to sex, side (right or left), position (facial or palatal), total treatment time (months), age at time of surgery, transposition with an adjacent tooth or teeth (1-8), and complications including gingival recession (Miller type I, II, or II) .

Case No.	Sex	Side R or L	Facial (F) or Palatal (P)	Time (month)	Age atsurgery	Transpose with	Complications
26	F	R	F	7	15Y3M		
		L	F	7	15Y3M		gingiva recession I
27	F	R	P	16	24Y5M	1, 2	gingiva recession I
28	F	R	F	4	23Y1M	2	gingiva recession I
29	F	L	F	4	10Y11M		
30	F	R	F	6	10Y3M		gingiva recession lateral incisor root resorption
31	F	L	P	7	16Y2M	1, 2	gingiva recession I
32	F	L	F	6	19Y2M	4, 5	gingiva recession I
33	F	L	P	5	34Y		gingiva recession III
34	F	L	P	7	20Y8M		
35	F	L	P	8	20Y4M	1, 2	
36	M	L	F	17	12Y8M		gingiva recession I
37	M	L	F	17	12Y4M	4	gingiva recession I
38	M	L	P	16	12Y7M		gingiva recession I
39	M	R	F	31	12Y		
40	M	L	F	6	13Y9M		
41	M	L	P	5	11Y11M	1, 2	
42	M	L	F	12	30Y		gingiva recession I lateral incisor root resorption
43	M	L	F	11	11Y6M	4	swelling
44	M	R	F	9	13Y	1, 2	gingiva recession I
45	M	L	P	13	23Y2M	2	
46	M	L	P	13	35Y11M	2	gingiva recession I
Total				**598**			

■ *Table 1B. (continued from the previous page)*

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- How to select passive and active attachments?

11:00-12:30 Winning protocols for challenging situations

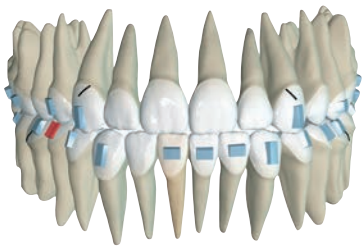
- Protocols to solve severe rotations
- How to avoid cracking aligners?

13:30-15:00 Vertical malocclusions. Introducing aligners and screws

- How to differently plan the perfect intrusion for the upper and lower arch?
- How to solve severe open bite using molar intrusion?
- How to conduct a smile design
- Use of aligners and screws to intrude molars

15:30-17:00 Sagittal malocclusions. Strategies to avoid extraction

- Upper molar distalization protocols
- Lower Molar distalization protocols
- Maximum anchorage using aligners and screws
- Protocols of elastics and sequence of movement



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Reference: Failure Rates for SS and Ti-Alloy Incisal Anchorage Screws: Single-Center, Double Blind, Randomized Clinical Trial (J Digital Orthod 2018;52:70-79)

** The overall success rate of 93.7% indicates that both SS and TiA are clinically acceptable for IZC BSs.
Reference: Failure rates for stainless steel versus titanium alloy infrazygomatic crest bone screws: A single-center, randomized double-blind clinical trial (Angle Orthod 2019;89(1):40-46)

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2020~2021 第十二年度

貝多芬 矯正精修班

時間：週二上午 9:00-12:00
地點：金牛頓教育中心（新竹市建中一路25號2樓）

上課日期：

2021

7/21、8/11、9/8、10/20、11/17、12/15
1/12、2/23、3/16、4/13、5/11

- 09:00 ~ 10:00　精選文獻分析
- 10:00 ~ 10:30　精緻完工案例
- 10:50 ~ 12:00　臨床技巧及常犯錯誤分享

全新的第十二年度 2020-21 貝多芬精修班， 是由國際知名講師張慧男醫師主持，並偕同貝多芬牙醫團隊住院醫師群共同主講。

每月一次的課程之中，包含了：

1. 精選矯正權威期刊 AJODO 的文章做文獻分析與評讀。
2. 精緻完工 ABO 案例報告，其中因應數位矯正的世界趨勢，Insignia 與 Invisalign 病例為課程探討的主要內容之一。
3. 分享臨床上常犯的錯誤以及解決方法。

2020-21 貝多芬精修班內容豐富精彩，讓您經由每個月一次的課程，在面對各式的臨床案例時，更能游刃有餘、得心應手。

學習目的：

研讀最新趨勢文章可以窺知世界文獻公認的治療方式，而藉由評論文章的優缺點不僅能夠訓練判斷與思考能力，更可以清楚比較作法上的不同，達到完整理解治療方向、內容與穩定性的目標。

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Extraction Treatment for a Class I Malocclusion with Bimaxillary Crowding and Deep Overbite

Abstract

A 23-year-1-month-old male presented for orthodontic consultation to evaluate crowding and facial protrusion. Clinical examination revealed a lower lip protrusion, increased facial height (58.5%), retrusive jaws (SNA 79.5°, SNB 74.5°), Class I molar relationship, bimaxillary crowding, flared incisors (U1 to SN 110°, L1 to MP 106°), excessive Curve of Spee, and deep overbite. The ABO Discrepancy Index (DI) was 21. All four first premolars were extracted and the malocclusion was treated with passive self-ligating brackets, sliding wire space closure, and auxiliary root torquing springs. Treatment outcomes are documented with an ABO Cast-Radiograph Evaluation (CRE) of 27 and a Pink & White (P&W) dental esthetic score of 4. (J Digital Orthod 2020;59:40-57)

Key words:

Crowding, deep overbite, torque control, passive self-ligating brackets, auxiliary root torquing (ART) spring

Introduction

Bimaxillary crowding with Class I molar relationship is very common among Asians.[1] Crowding is not only an esthetic problem, but may also lead to periodontal diseases due to difficulty in maintaining oral hygiene. Extracting four first premolars is an efficient way to relieve bimaxillary crowding,[2] but other factors must be considered, such as facial profile, lip protrusion, and mandibular plane angle. Torque control (*maintaining desired axial inclinations*) may be an issue while closing extraction sites. Tipping incisors distally (*loss of torque*) is common when spaces are closed in the arch.[3] This case report documents extraction treatment for bimaxillary crowding, and details effective torque control measures for retracting maxillary incisors.

Diagnosis

Pretreatment records (*Figs. 1-4*) revealed the facial and dental morphology of the Class I crowded malocclusion. The face was symmetrical in the frontal plane, but the facial profile was protrusive due to a prominent lower lip (*Fig. 1*). An overjet of 6mm was associated with a deep overbite of 5.5mm (*Fig. 2*). The tooth size to arch length discrepancies (*crowding*) were -3mm in the upper arch and -10.5mm in the lower arch. There was no intermaxillary midline deviation, but the upper and lower central incisors were canted about 10° to the left (*Fig. 5*). No additional contributing medical or dental factors were reported.

Despite lower lip protrusion (*5mm to the E-Line*), cephalometric analysis revealed a relatively retrusive

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skeletal relationship (*SNA 79.5°, SNB 74.5°*) with an excessive ANB of 5° (*Fig. 2, Table 1*). The mandibular plane angle (*SN-MP 33°*) and axial inclination of maxillary incisors were normal, but the lower incisors were flared to the mandibular plane (*106°*). The panoramic radiograph showed impacted, mesially inclined lower third molars (*Fig. 4*). Lower incisors were extruded, resulting in a deep Curve of Spee. No intermaxillary functional shift was noted, but central incisors in both arches were tipped about 10° to the left (*Fig. 5*). Temporomandibular joint (*TMJ*) imaging was symmetrical in the open and closed positions (*Fig. 6*). The American Board of Orthodontics (*ABO*) Discrepancy Index (*DI*) was 21 points as shown in the subsequent Worksheet 1.

Fig. 1: Pre-treatment facial and intraoral photographs

Fig. 2:
Pre-treatment cephalometric radiograph with a red E-Line to evaluate lip protrusion

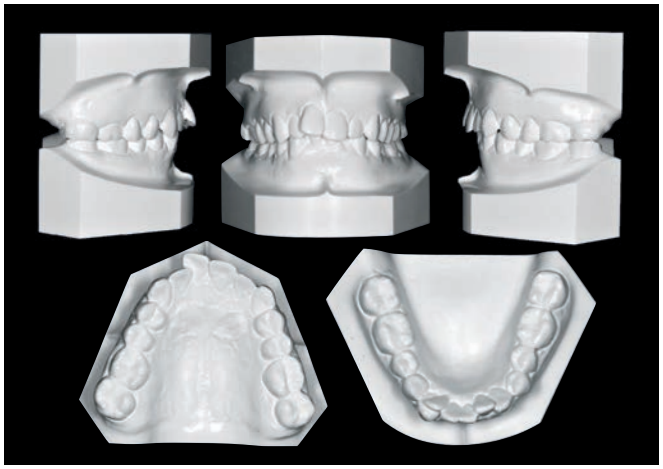

Fig. 3: Pre-treatment study models (casts)

Fig. 4: Pre-treatment panoramic radiograph

Fig. 5:
Frontal intraoral photograph with the bite opened shows deep lower Curve of Spee and the axial inclinations of the incisors. See text for details.

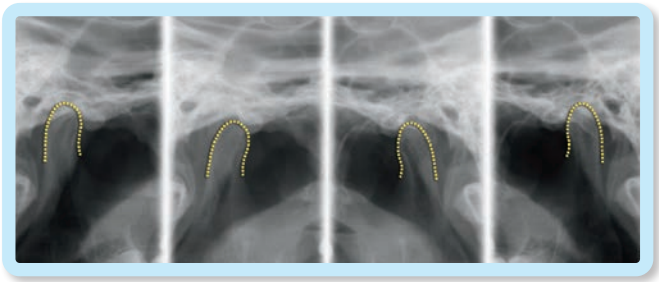

Fig. 6:
Pre-treatment temporomandibular joint (TMJ) radiographs show the right TMJ in the left two images and the left TMJ in the right two images. The closed positions (outside images) and the open positions (inside images) are shown, respectively.

Treatment Objectives

1. Maintain intermaxillary dimensions in all three skeletal planes.
2. Relieve crowding by extracting all four first premolars.
3. Level and align both dental arches.
4. Perform interproximal reduction (*IPR*) to reshape teeth and correct black triangles.
5. Correct overjet and overbite.

6. Align both arches.

7. Optimize occlusion (*intermaxillary contacts*).

Treatment Plan

According to the extraction decision table (*Table 2*), extraction is based on the evaluation of the profile, mandibular plane angle, overbite, axial inclination of incisors, crowding, and decayed or missing teeth.[4] The current patient had a protrusive profile, flared incisors, and crowded arches. Arch development can be efficient for resolving crowding, but extraction of four first premolars is particularly effective for improving the profile, retracting incisors, and relieving severe crowding. After a discussion with the patient about the available options, the treatment plan selected was: extract four first premolars, use a passive self-ligating bracket system, and close space to resolve both crowding and lip protrusion. When optimal alignment is achieved, remove all fixed appliances and fabricate anterior fixed retainers.

CEPHALOMETRIC SUMMARY			
SKELETAL ANALYSIS			
	PRE-Tx	POST-Tx	DIFF.
SNA° (82°)	79.5°	79.5°	0°
SNB° (80°)	74.5°	74.5°	0°
ANB° (2°)	5°	5°	0°
SN-MP° (32°)	33°	34.5°	1.5°
FMA° (25°)	26°	27.5°	1.5°
DENTAL ANALYSIS			
U1 To NA mm (4 mm)	6	1	5
U1 To SN° (110°)	110°	95°	15°
L1 To NB mm (4 mm)	9	7	2
L1 To MP° (90°)	106°	102°	4°
FACIAL ANALYSIS			
E-LINE UL (2-3 mm)	1	1.5	0.5
E-LINE LL (1-2 mm)	5	4	1
%FH: Na-ANS-Gn (53%)	58.5%	59.5%	1%
Convexity: G-Sn-Pg' (13°)	12°	13°	1°

Table 1: Cephalometric summary

	Ext.	Not
1. Profile	Protrusive	Straight
2. Md. angle	High	Low
3. Bite	Open	Deep
4. Ant. inclination	Flaring	Flat
5. Crowding	> 7mm	None
6. Decay/missing	Present	????
7. P't perception	OK	No
8. Etc...		

Table 2: Extraction decision table

Seven clinical factors are considered during the decision making process to extract teeth. Additional factors (8. Etc…) can be added as needed. Factors favoring and ***not*** *favoring extraction are shown in the center and right columns, respectively.*

Supplement retention with clear overlay retainers is prescribed for full-time wear for 6 months and then nights only indefinitely.

Treatment Progress

The Damon Q® passive self-ligating system (*Ormco, Brea, CA*) was selected as the fixed appliance and all archwires, elastics, and auxiliaries were produced by the same supplier. Following extraction of all four first premolars, the upper central incisors and canines were bonded with high torque brackets, and the adjacent lateral incisors were bonded with standard torque brackets. One month later, standard torque brackets were bonded on all teeth in the lower arch except for the right lateral incisor due to crowding.

Copper-nickel-titanium (*CuNiTi*), titanium molybdenum alloy (*TMA*), and stainless steel (*SS*) were the materials of choice. The upper arch was leveled and aligned with the following archwire sequence: 0.014-in CuNiTi, 0.018-in CuNiTi, 0.014x0.025-in CuNiTi, 0.017x0.025-in TMA, 0.016x0.025-in SS, and 0.016-in SS. The lower archwire sequence was 0.014-in CuNiTi, 0.014x0.025-in CuNiTi, 0.017x0.025-in TMA, and 0.016x0.025-in SS (*Table 3*).

When the initial lower archwire (*0.014-in CuNiTi*) was inserted at one month into treatment, an open coil spring was placed between the right central incisor and canine to create space for the lateral incisor. In the 2nd month of treatment, the archwire on the upper arch was changed to 0.018-in CuNiTi to continue arch development as levelling and alignment were accomplished. Four months into treatment, the space between the lower right central incisor and canine was sufficient, so a bracket was bonded on the lower right lateral incisor.

In the 5th month of treatment, the upper archwire was changed to 0.014x0.025-in CuNiTi to continue arch development, as levelling and aligning was completed. In the 6th month, the upper anterior teeth were aligned, so the upper archwire was changed to 0.017x0.025-in TMA. The upper 3-3 segment was ligated with a figure-8 SS ligature tie to prevent space opening during retraction of the anterior segment. Power chains were applied from 7 to 7 on the upper arch for space closure. A 0.014x0.025-in CuNiTi archwire was placed on the lower arch. The patient was instructed to wear Class II elastics (*Quail 3/16-in, 2-oz*) for overjet correction.

In the 7th month of treatment, two anterior bite turbos (*occlusal prematurities*) were bonded on the lingual surfaces of the upper central incisors to facilitate deep bite correction (*Fig. 7*). The lower archwire was changed to 0.017x0.025-in TMA, and the lower 3-3 segment were ligated together with a figure-8 SS ligature tie. Power chains were applied from 7 to 7 in the lower arch for space closure. The patient was instructed to wear Class II elastics (*Fox 1/4-in, 3.5-oz*) full time.

In the 10th month of treatment, the upper archwire

Fig. 7:
Anterior bite turbos were bonded on the lingual surfaces of the upper central incisors to facilitate deep bite correction.

was changed to 0.016x0.025-in SS. Since torque was lost for the upper incisors (2-2) during space closure, +15° torque was adjusted into the upper 2-2 area of the rectangular archwire. In the 11th month, it was clear that the torque applied on the wire was inadequate, so an auxiliary root torquing (*ART*) spring was used on the upper incisors to apply lingual root torque (*Fig. 8*). The patient was instructed to wear L-type elastics (*Fox 1/4-in, 3.5oz.*) from the upper canines to the lower molars to help correct the overjet. Treatment progression is shown

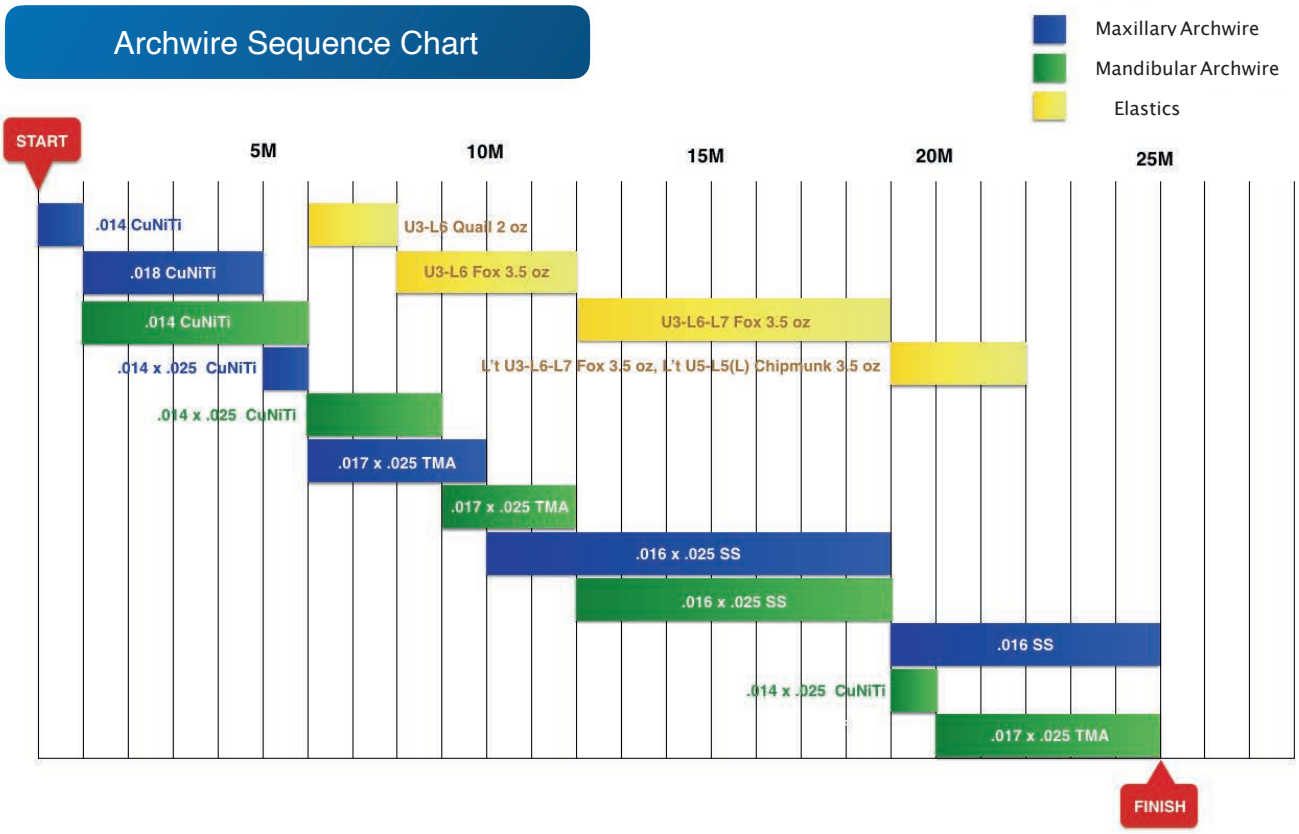

Table 3: Archwire sequence chart shows the initiation and duration of mechanics during active treatment.

Fig. 8:
An auxiliary root torquing (ART) spring delivers lingual root torque to the upper incisors.

in a sequence of intraoral photographs taken in the following planes: frontal (*Fig. 9a*), right buccal (*Fig. 9b*), left buccal (*Fig. 9c*), upper occlusal (*Fig. 9d*), and lower occlusal (*Fig. 9e*).

In the 12th month of treatment, the lower archwire was changed to 0.016x0.025-in SS, and reverse Curve of Spee was adjusted into the wire to flatten the arch. In the 15th month of treatment, torque for

Fig. 9a:
Consecutive frontal intraoral photographs document 25 months (M) of active treatment from the start (0M) to 25M in a clockwise order. See text for details.

Fig. 9b:
Consecutive right-buccal intraoral photographs document 25 months (M) of active treatment from the start (0M) to 25M in a clockwise order. See text for details.

upper anteriors was adequate so the ART spring was removed. In the 16th month of treatment, interproximal reduction (*IPR*) was carried out on the lower right central and lateral incisors to change the triangular crown shapes to a more esthetic rectangular contour.

In the 17th month of treatment, a single tooth torquing spring (*QS*) was applied to the upper right central incisor to apply additional lingual root torque for detailing the occlusion. In the 19th month of treatment, the QS on the upper right central incisor was removed. A button was bonded on the lingual side of lower left 2nd premolar, and the patient was instructed to wear a cross-bite elastic (*Chipmunk 1/8-in, 3.5oz.*) from the buccal side of the upper left 2nd premolar to the lingual side of the lower left 2nd premolar to correct the bucco-

Fig. 9c:
Consecutive left-buccal intraoral photographs document 25 months (M) of active treatment from the start (0M) to 25M in a clockwise order. See text for details.

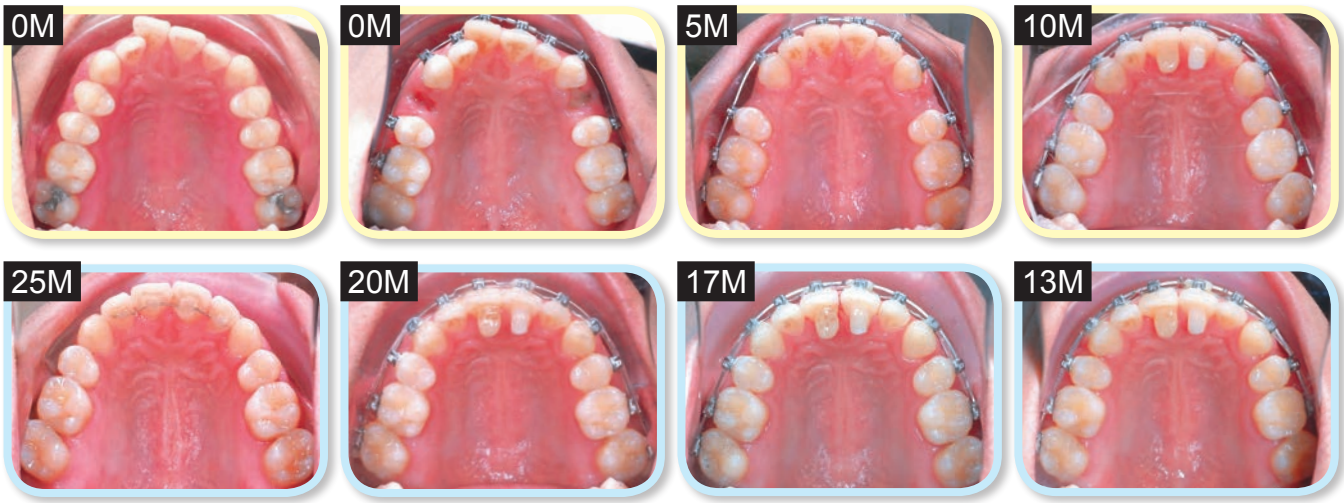

Fig. 9d:
Consecutive upper occlusal intraoral photographs document 25 months (M) of active treatment from the start (0M) to 25M in a clockwise order. See text for details.

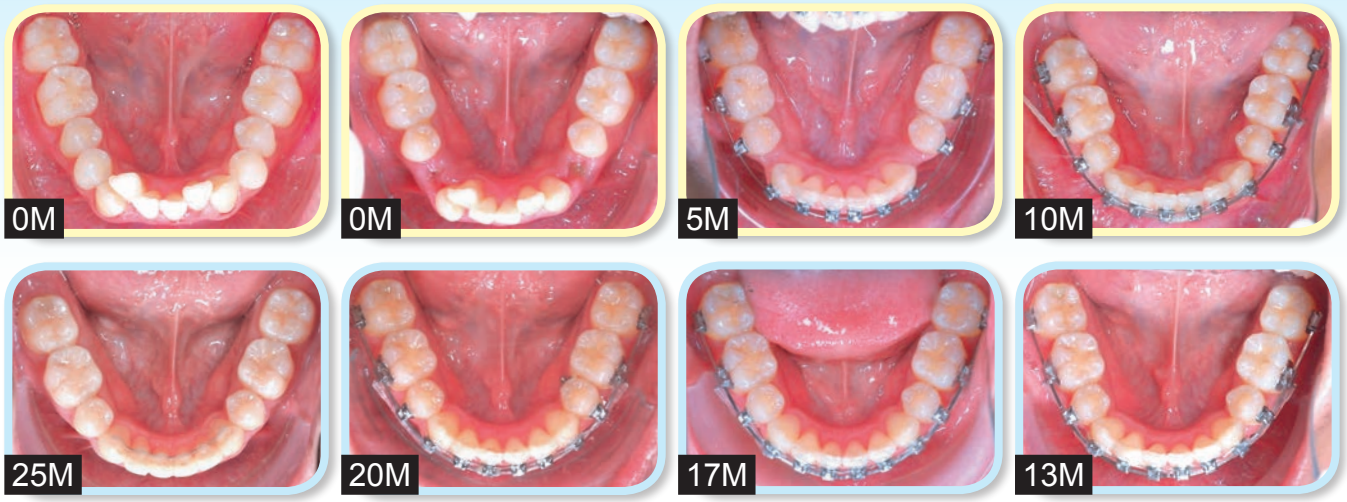

Fig. 9e:
Consecutive lower occlusal intraoral photographs document 25 months (M) of active treatment from the start (0M) to 25M in a clockwise order. See text for details.

lingual relationship. On the left side, L-type elastics (*Fox 1/4-in, 3.5oz.*) from the upper canine to lower molars were used to correct the midline and detail the occlusion.

In the 22nd month of treatment, IPR was carried out on the lower central and lateral incisors to correct dark triangles. A power chain supplemented with power thread was applied to close the space created by the IPR. After 25 months of active treatment, all appliances were removed. Upper and lower clear overlay and fixed anterior (*upper 2-2, lower 3-3*) retainers were delivered to both arches.

Treatment Results

The patient was treated to the desired result as documented in Figs. 10-13. Note the horizontally impacted lower third molar (*LL8*) was removed, but the LR8 was still present and extraction was recommended. The superimposed cephalometric tracings are presented in Fig. 14. The space closure mechanics contributing to the cephalometric results are described for passive and active units in Figs. 15a-d. For the present patient, moderate anchorage (*Fig. 15d*) resulted in retraction of maxillary incisors and lower lip protrusion (*Fig. 14*).

A summary of the cephalometric measurements before and after treatment is provided in Table 1. The ABO Cast-Radiograph Evaluation (*CRE*) score was 27 points, as documented in the subsequent Worksheet 2. All premolar extraction spaces were closed and the large overjet was corrected. The major occlusal discrepancies were marginal ridges (*5 points*) and root angulation (*3 points*). Additional bracket repositioning particularly of the lower first molars would have improved the outcome.

The Pink & White dental esthetic score was 4 points, as documented in Worksheet 3 appearing later in this report. Overall, the crowding was resolved and

Fig. 10: Post-treatment facial and intraoral photographs

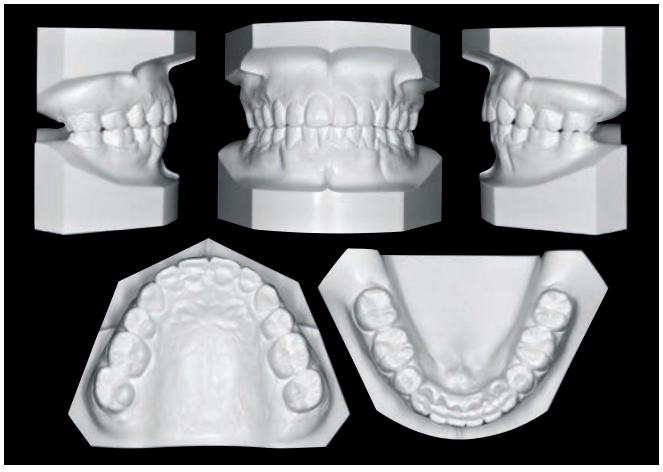

Fig. 11: Post-treatment study models (casts)

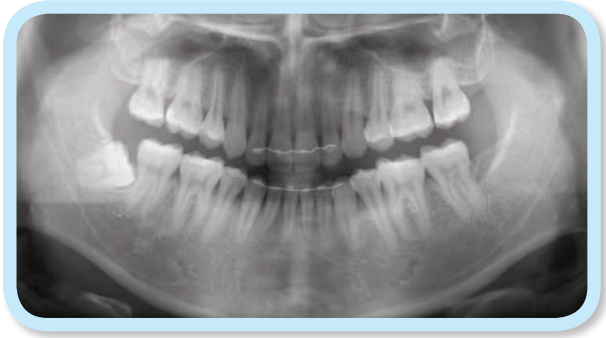

Fig. 12: Post-treatment panoramic radiograph

Fig. 13: Post-treatment cephalometric radiograph

the protrusive lower lip was corrected by retracting the upper and lower incisors. The patient was satisfied with the result.

Fixed retainers were bonded on all upper incisors and from canine to canine in the lower arch. Upper and lower clear overlay retainers were delivered. The patient was instructed to wear them full time for the first 6 months and then nights only thereafter. Home care and retainer maintenance instructions were also provided.

Discussion

Bimaxillary crowding with Class I molar relationship is common among Asians, and frequently premolars are extracted in all four quadrants to relieve the

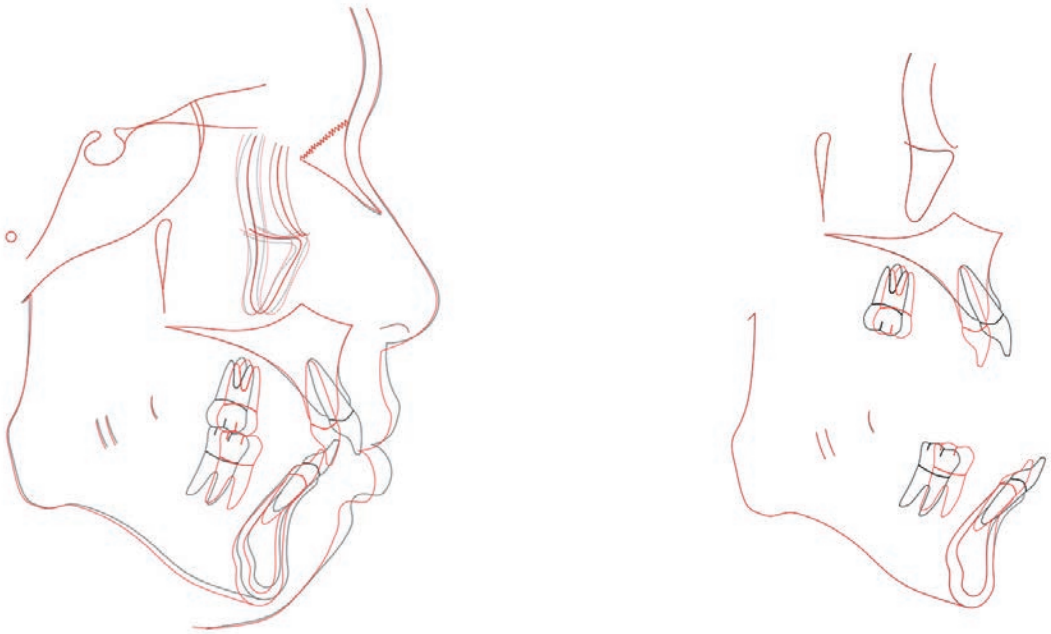

Fig. 14:
Superimposed cephalometric tracings show the dentofacial changes after 25 months of active treatment (Pre-Tx: black; Post-Tx: red). The tracings are superimposed on the anterior cranial base (left), maxilla (upper right), and mandible (lower right). See text for details.

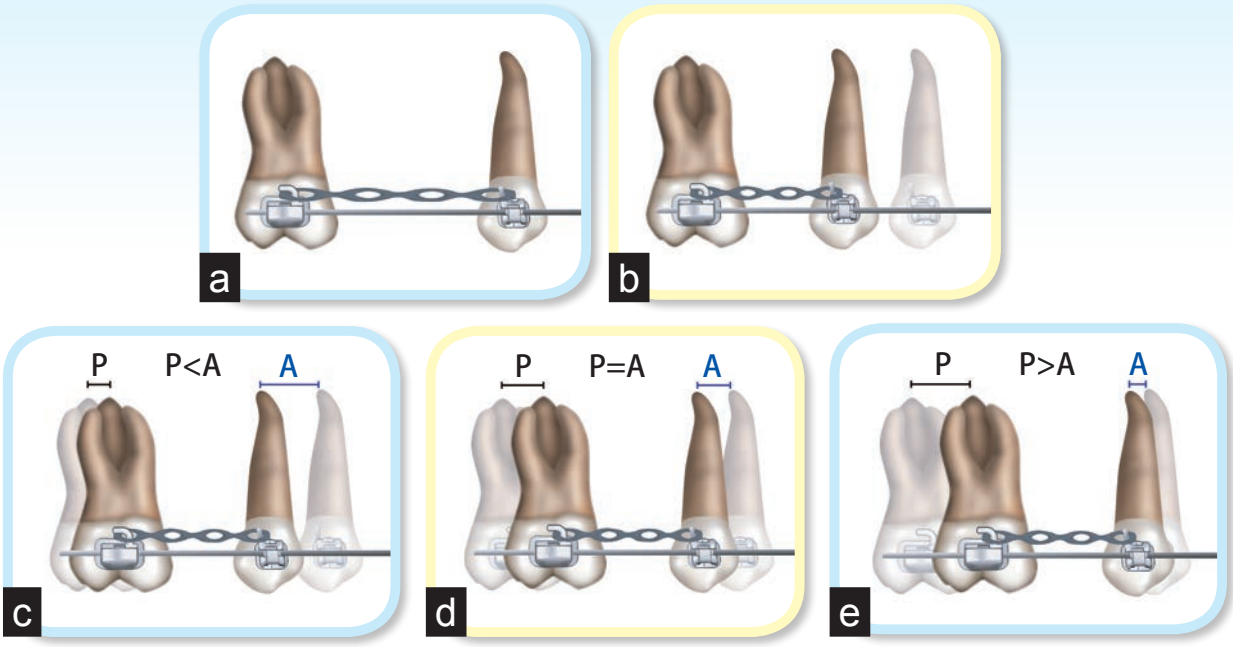

Fig. 15:

a. Initiation of sliding wire space closure shows brackets engaged on an archwire with force delivered by a chain of elastics. The molar is defined as the passive unit and the premolar is deemed the active unit. See text for details.

b. Absolute anchorage is when the passive molar is ankylosed or is stabilized with bone screws. The premolar is retracted but the molar does not move.

c. Maximum anchorage (P<A) is defined as when the previously passive unit (P) moves less than the active unit (A). See text for details.

d. Moderate anchorage (P=A) is defined as equal and opposite movement of the previously passive (P) and active (A) units.

e. Minimal anchorage (P>A) is defined as more movement of the previously passive unit (P) compared to the active unit (A). See text for details.

arch length discrepancy. An alternative is expanded archwires and self-ligating brackets to develop (*expand*) the arches to correct crowding without extractions. As illustrated in the extraction decision table (*Table 2*), the decision to remove teeth is based on an evaluation of the profile, mandibular plane angle, overbite, axial inclination of incisors, crowding, and decayed or missing teeth.[4] The current patient had a protrusive lower lip, flared incisors, and crowded arches. Extracting four first premolars was deemed the most efficient approach for correcting the profile by retracting the incisors. Two common complications during the closure of extraction spaces are loss of posterior anchorage and the "*drawbridge effect*" (*distal tipping of incisors*).

According to Newton's third law of motion, every action has an equal and opposite reaction, so anchorage control is an issue in extraction cases.[5] For the present patient, it was desirable to utilize half of the extraction space for alleviation of crowding and retraction of the anterior segments, i.e. moderate anchorage (*Fig. 15d*). The protrusive profile of the patient was adequately resolved after levelling

and alignment. Therefore, there was no need to supplement posterior anchorage with bone screws in either arch to achieve absolute anchorage (*Fig. 15b*).

Torque control is an additional complication associated with space closure. The anterior teeth may be tipped distally (*"retroclined"*) after retracting the anterior segment.[6] To avoid this undesirable change in the upper arch, high torque brackets are indicated for the maxillary incisors. If torque loss is encountered during treatment, the problem can be resolved without replacing the brackets, and instead by adjusting +15° of lingual root torque into the anterior segment of the archwire and/or placing an auxiliary root torquing (*ART*) spring. ART springs are configured in a circle with a series of radially projecting U-shaped bent portions (*vertical loops*). Hooks are formed at each end of the ART spring to activate the device (*Fig. 16*). When the ART spring is activated, a distal force is applied to the clinical crown more apically than the level of the archwire, i.e. a mechanical couple. These mechanics result in a root lingual moment on the incisors (*Fig. 17*).

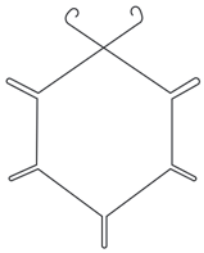

Fig. 16:
An ART spring is a round SS wire configured with vertical loops that is formed into a circle. There is a hook at each end of the ART spring to engage the archwire for activating the appliance. See text for details.

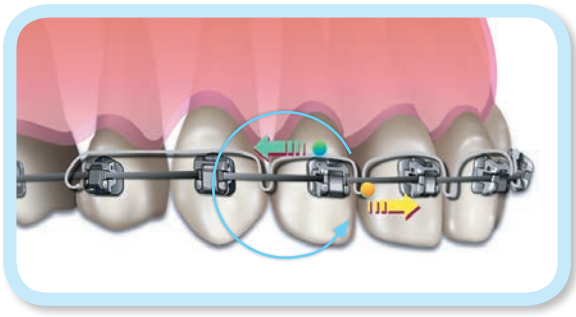

Fig. 17:
When the ART spring is activated by engaging the hook on the archwire, the vertical interproximal loops apply force relative to the archwire, which results in a couple on the incisors, which is a lingual root torque moment. Crown movement in the direction of the blue arrow is resisted by the cinched archwire. The equal and opposite moment (labial root torque) tends to move the crowns in the direction of the yellow arrow, but that undesirable effect is resisted by the cinched archwire. The net effect for ART spring mechanics is lingual root torque on the incisors. See text for details.

Interproximal reduction (*IPR*) of enamel has long been used in orthodontics to obtain more space for alignment, increase the length of interproximal contacts, render a more esthetic rectangular shape for triangular crowns, and reduce black triangles.[7,8] The current patient had triangularly shaped lower

Fig. 18:
The patient had triangular lower incisors, especially the lower right central and lateral incisors. The affected teeth were reshaped with IPR. See text for details.

incisors, especially the lower right central and lateral incisors (*Fig. 18*). IPR was performed in the 16th month of treatment to improve alignment and esthetics. Subsequently, black triangles were noted superior to the gingival papillae of the lower incisors. In the 22nd month of treatment, IPR was repeated in the lower anterior region to create interproximal space for the correction of the black triangles with space closure.

Anterior turbos (*bite openers*) are excellent adjuncts for anterior deep bite correction. Bite turbos open the bite and unlock intermaxillary interdigitation to allow extrusion of posterior teeth to flatten the arches. The increased freedom of tooth movement is effective for levelling the Curve of Spee, correcting deep bite, and avoiding interference with the lower brackets.[9-12] Anterior bite turbos facilitated intrusion of the lower incisors, extrusion of the posterior teeth, and produced an increase in the mandibular plane angle of 1.5°, to 27.5° (*Fig. 7, Table 1*).

Fig. 19: Facial and intraoral photographs at 4Y7M follow-up

Conclusions

A 23-year-old male presented with a protrusive lower lip, crowding in both arches, deepbite, and excessive overjet. After 25 months of treatment with extraction, the profile was improved, crowding was relieved, deepbite was corrected, and overjet was resolved. There are four keys to this case:

(1) Extraction of four first premolars is efficient for simultaneously correcting crowding and for reducing lip protrusion to improve the facial profile.

(2) Anterior bite turbos and Class II elastics are effective for resolving the large overjet and overbite.

(3) Interproximal reduction provides arch length to correct crowding, improve lower incisor shape, and resolve black triangles.

(4) Auxiliary root torque (*ART*) segments and individual tooth torquing springs are helpful for correcting axial inclinations of maxillary incisors.

Fig. 19 documents the current condition of the patient around 4 years and 7 months (*4Y7M*) post-treatment.

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Discrepancy Index Worksheet

TOTAL D.I. SCORE 21

OVERJET

0 mm. (edge-to-edge)	=	1 pt.
1 – 3 mm.	=	0 pts.
3.1 – 5 mm.	=	2 pts.
5.1 – 7 mm.	=	3 pts.
7.1 – 9 mm.	=	4 pts.
> 9 mm.	=	5 pts.

Negative OJ (x-bite) 1 pt. per mm. per tooth =

Total = 3

OVERBITE

0 – 3 mm.	=	0 pts.
3.1 – 5 mm.	=	2 pts.
5.1 – 7 mm.	=	3 pts.
Impinging (100%)	=	5 pts.

Total = 3

ANTERIOR OPEN BITE

0 mm. (edge-to-edge), 1 pt. per tooth
then 1 pt. per additional full mm. per tooth

Total = 0

LATERAL OPEN BITE

2 pts. per mm. per tooth

Total = 0

CROWDING (only one arch)

1 – 3 mm.	=	1 pt.
3.1 – 5 mm.	=	2 pts.
5.1 – 7 mm.	=	4 pts.
> 7 mm.	=	7 pts.

Total = 7

OCCLUSION

Class I to end on	=	0 pts.
End on Class II or III	=	2 pts. per side _____pts.
Full Class II or III	=	4 pts. per side _____pts.
Beyond Class II or III	=	1 pt. per mm. additional _____pts.

Total = 0

LINGUAL POSTERIOR X-BITE

1 pt. per tooth Total = 0

BUCCAL POSTERIOR X-BITE

2 pts. per tooth Total = 0

CEPHALOMETRICS (See Instructions)

ANB ≥ 6° or ≤ -2° = 4 pts.

Each degree < -2° _____ x 1 pt. = _____

Each degree > 6° _____ x 1 pt. = _____

SN-MP

≥ 38° = 2 pts.

Each degree > 38° _____ x 2 pts. = _____

≤ 26° = 1 pt.

Each degree < 26° _____ x 1 pt. = _____

1 to MP ≥ 99° = 1 pt.

Each degree > 99° 7 x 1 pt. = 7

Total = 8

OTHER (See Instructions)

Supernumerary teeth	_____ x 1 pt. =	_____
Ankylosis of perm. teeth	_____ x 2 pts. =	_____
Anomalous morphology	_____ x 2 pts. =	_____
Impaction (except 3rd molars)	_____ x 2 pts. =	_____
Midline discrepancy (≥3mm)	@ 2 pts. =	_____
Missing teeth (except 3rd molars)	_____ x 1 pts. =	_____
Missing teeth, congenital	_____ x 2 pts. =	_____
Spacing (4 or more, per arch)	_____ x 2 pts. =	_____
Spacing (Mx cent. diastema ≥ 2mm)	@ 2 pts. =	_____
Tooth transposition	_____ x 2 pts. =	_____
Skeletal asymmetry (nonsurgical tx)	@ 3 pts. =	_____
Addl. treatment complexities	_____ x 2 pts. =	_____

Identify:

Total = 0

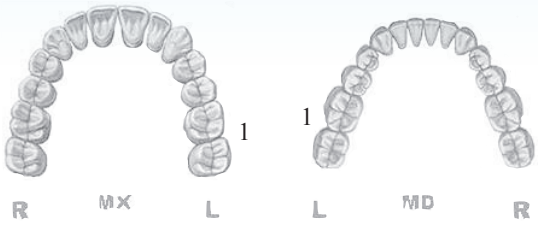
Cast-Radiograph Evaluation

Case # **Patient**

Total Score: 27

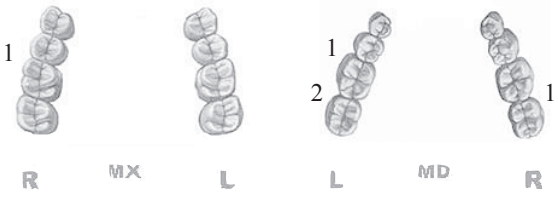
Alignment/Rotations

2



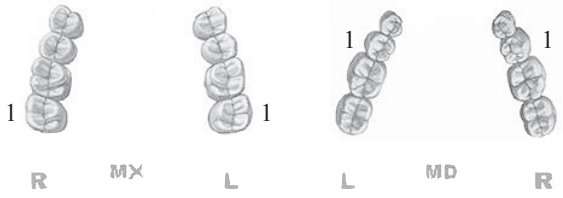
Marginal Ridges

5



Buccolingual Inclination

4

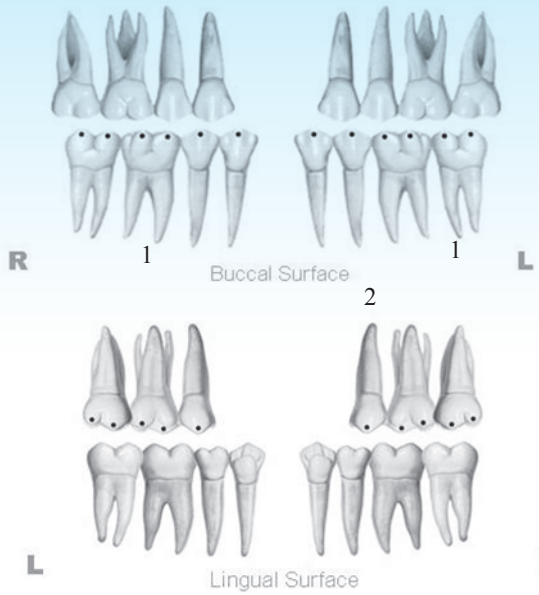


Overjet

4

Occlusal Contacts

4

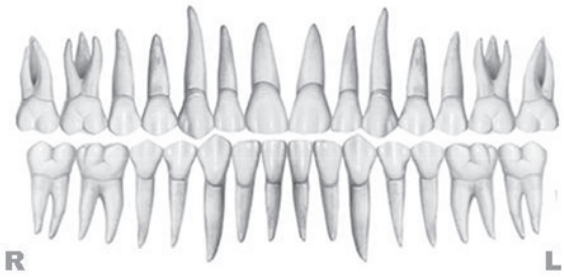


Occlusal Relationships

5

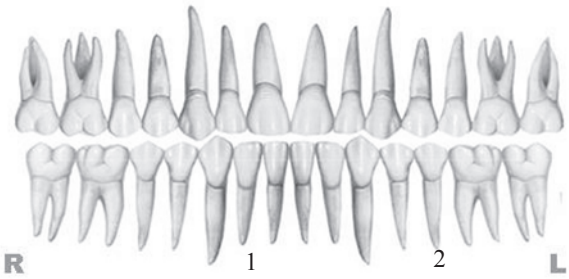
Interproximal Contacts

0



Root Angulation

3



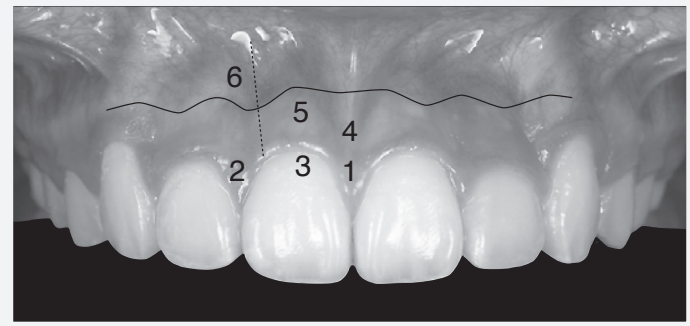
INSTRUCTIONS: Place score beside each deficient tooth and enter total score for each parameter in the white box. Mark extracted teeth with "X". Second molars should be in occlusion.

IBOI Pink & White Esthetic Score

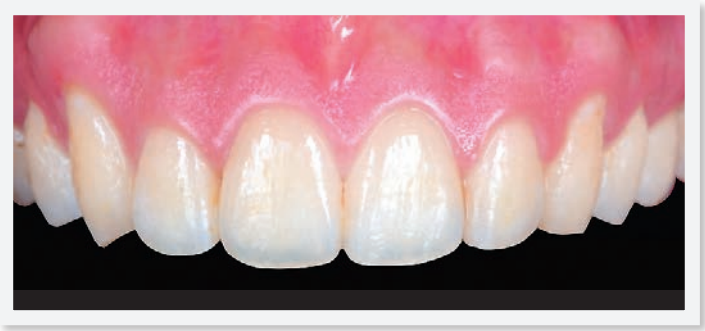
Total Score: = 4

1. Pink Esthetic Score

Total = 2



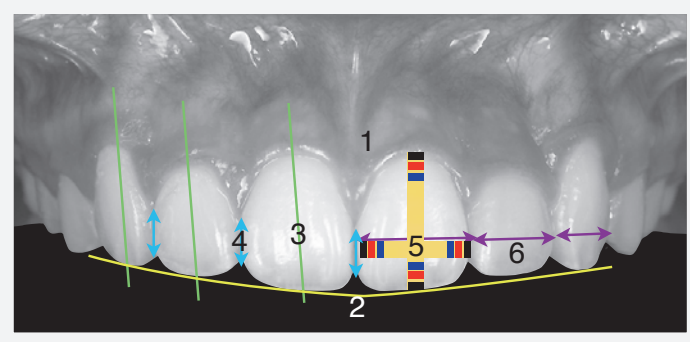
1. M & D Papillae	0	1	2
2. Keratinized Gingiva	0	1	2
3. Curvature of Gingival Margin	0	1	2
4. Level of Gingival Margin	0	1	2
5. Root Convexity (Torque)	0	1	2
6. Scar Formation	0	1	2



1. M & D Papilla	(0)	1	2
2. Keratinized Gingiva	(0)	1	2
3. Curvature of Gingival Margin	0	(1)	2
4. Level of Gingival Margin	0	(1)	2
5. Root Convexity (Torque)	(0)	1	2
6. Scar Formation	(0)	1	2

2. White Esthetic Score (for Micro-esthetics)

Total = 2



1. Midline	0	1	2
2. Incisor Curve	0	1	2
3. Axial Inclination (5°, 8°, 10°)	0	1	2
4. Contact Area (50%, 40%, 30%)	0	1	2
5. Tooth Proportion (1:0.8)	0	1	2
6. Tooth to Tooth Proportion	0	1	2

1. Midline	(0)	1	2
2. Incisor Curve	(0)	1	2
3. Axial Inclination (5°, 8°, 10°)	0	(1)	2
4. Contact Area (50%, 40%, 30%)	(0)	1	2
5. Tooth Proportion (1:0.8)	(0)	1	2
6. Tooth to Tooth Proportion	0	(1)	2

第十屆中華民國源遠牙醫學會
第二次會員大會學術演講

張慧男 博士
CHRIS CHANG, PHD

張慧男醫師於1994年獲得美國印地安那大學骨生理學博士，1996年取得矯正專科學位。他目前是美國矯正學會院士，Angle Society會員，以及中華民國齒顎矯正專科醫師。

張醫師的著作常見於國際期刊，出版過多本矯正專書，目前擔任國際數位矯正期刊的發行人。他也是國際上公認以簡易力學設計處理跨科複雜案例的專家。除了教學和臨床工作之外，他也是骨釘品牌OBS®的發明人和創辦人，同時也是貝多芬矯正中心和金牛頓藝術科技的創辦人。

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程序表

08:30	報到
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10:20 ~ 10:40	休息
10:40 ~ 12:00	日常輔助矯正的小型手術 Part II

主辦單位：中華民國源遠牙醫學會　　協辦單位：中華民國齒顎矯正學會

推薦文

張慧男醫師已經連續好幾年受邀在美國矯正學會年會演講（美國矯正學會是目前世界最大的矯正學會活動，從世界各國來的與會醫師超過一萬人）。每次張醫師的演講會場都是人山人海，盛況空前。當然這也跟他這幾年來經常在全世界各地演講有關；讓他逐漸成為全世界知名而且極為受歡迎的演講者。2019年張醫師更獲得了美國矯正學會頒發AJO-DO Case Report of the Year的殊榮。這不僅是他個人的榮耀，同時也大大的提升了台灣在全世界矯正界中的名聲和地位；真可謂另類的台灣之光。我非常樂意向各位推薦出身台灣的世界級講師。請大家把握這次難得的機會，不用出國也可以親身聆聽大師級的精彩演講；絕對是非常值得的。這次難得的盛會，相信會為你帶來全新的視野，實在是不容錯過。

中華民國齒顎矯正學會理事長 **呂世平醫師** 鄭重推薦

It's easy!
天下難事，必做於易
天下大事，必做於細
{老子道德經「無難」篇}

齒顎矯正學發展的兩大支柱，其一是探索病源機轉；例如Graber的「Malfunction, Malformation & Malocclusion」與Moss的「Genetic, Epigenetic & Causative Factors」都是在闡明「事出必有因」，強調齒顎矯正學首重參透「病因」，在面對「病果」時自然可以掌握最佳時機運用最佳方法治癒；甚至在療後維持期選擇最恰當的維持器設計，也與病源機轉有密切關係。其二是突破創新，例如：Andrew的「Straight Wire Appliance」大幅減少了wire bending的手技需求，Burstone的「Segmented Arch Technique」把矯正治療的active unit與reactive unit清楚分開，有利於力學掌控。乃至近年來的自鎖式矯正器試圖降低磨擦力，增加病患的舒適感...等等。

張慧男博士的突破與創新，縱觀台灣二十幾年來（張博士是1996年回台）無人能出其右；依個人的觀察，他的勇於突破與屢創新猷應該是植基於豐富的藝術細胞和深厚的專業科學素養，加上他特有的手藝及作畫天分將藝術融入醫療創意。張博士在演講中經常的口頭禪是「It's easy!」。老子道德經說道：「天下難事得從易處著手，天下大事得從細處下手」；2020-10-18歡迎喜歡欣賞藝術和探討科學的同好們一起來見證一場「細與易」的精彩結合。

現任台北醫學大學兼任臨床教授
台灣口腔矯正醫學會 顧問 **許必靈**

推薦張慧男醫師

教室像電影院
一起來享受張慧男醫師的精彩演講

14年前慧男邀我一起辦雜誌，我想這是一件很不容易作好的事，沒想到在慧男與高老師的努力不懈中，雜誌已因應時代變遷與時俱進地一路改名：News and Trends in Orthodontics（Vol. 1, Jan, 2006: 8 pages）、International Journal of Orthodontics and Implantology、Journal of Digital Orthodontics（Vol. 58, Apr, 2020: 108 pages）。它含蓋了矯正骨釘的應用，與植體合併的跨科整合治療，最近更將最新的數位矯正併入，使得這本英文雜誌在質與量均是世界一流的雜誌，難得的是以張醫師團隊為主，一年四期，不但由原本的八頁躍升到近來的百餘頁，且14年來每期準時出刊，更難得的這一臨床非常實用的雜誌提供全世界的牙醫師免費線上閱讀。這本一流的矯正雜誌對國內外矯正界做了非常大的貢獻。

慧男熱心教學，幾乎沒間斷的國內外教學加上他超級的簡報能力，教學相長使他在短短的11年內，慧男已經演講37個國家，近6年來更是年年受邀到AAO演講，且場場爆滿是最受歡迎的講師。真是矯正界的台灣之光。

慧男是天才型演講家，擅長於將複雜的理論，以精彩的圖解加上有條不紊的幽默說明，聽他的每場演講均是在愉快氣氛下學習到寶貴實用的臨床經驗，我們一起進入慧男的齒顎矯正電影院好好享受吧!

中華民國齒顎矯正學會 顧問
台灣口腔矯正醫學會 顧問 **林錦榮**

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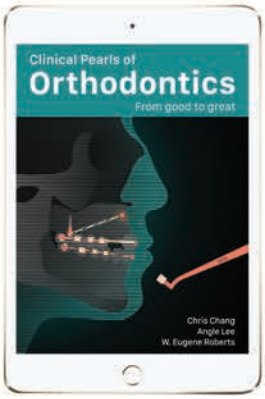

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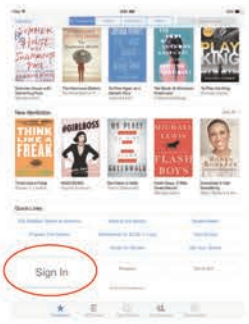

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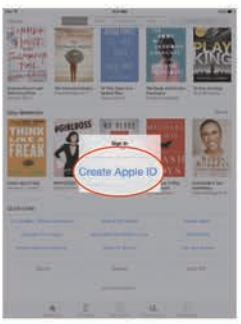

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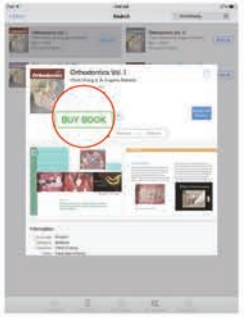

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Efficient Procedure for Precise Bonding of Aligner Attachments

Abstract

Computer-generated attachments, as specified in the ClinCheck® simulation, must be precisely duplicated chair-side on the patient's dentition. This article describes the use of flexible attachment templates for each quadrant. Windows (reliefs) for each specified attachment are filled with composite resin that is bonded on the surface of the teeth. Standard operative procedure, quality control checks, and patient training are reviewed. This article provides step-by-step descriptions and illustrations for efficiently and precisely initiating aligner therapy. This protocol is standard operating procedure at the Beethoven Orthodontic Center. (J Digital Orthod 2020;59:64-73)

Introduction

Attachments are a critical part of clear aligner systems, which are designed to deliver precise and effective control of tooth movement. For most malocclusions, the attachment bonding procedure is the first step in preparing the arches for aligner treatment.[1,2] Precision bonding of the planned attachments is essential for delivering the mechanics required to achieve the planned outcome (*Fig. 1*). The first three "*aligners*" in the series are actually 3D overlays of the digitized dentition that are specific-purpose appliances. The most critical steps in the procedure are well noted (*Latin: nota bene*) for the reader and marked with a NB in bold italics (***NB***).

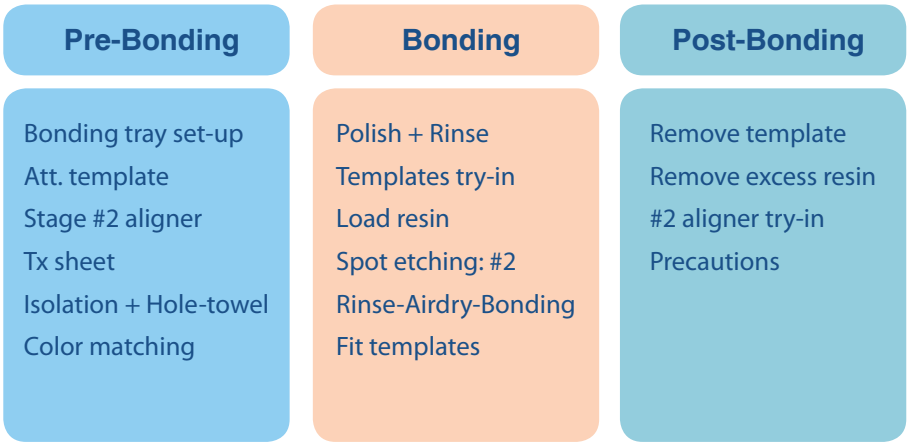

Fig. 1:
There are 3 phases (left to right) for the aligner attachment process. Multiple procedures in sequence are required for each phase. See text for details.

Joshua Lin,
Lecturer, Beethoven Orthodontic Course (Left)
Chris H. Chang,
Founder, Beethoven Orthodontic Center
Publisher, Journal of Digital Orthodontics (Center)
W. Eugene Roberts,
Editor-in-Chief, Journal of Digital Orthodontics (Right)

Introduction to Aligners

The first overlays (*Aligner set #1*) are prepared on the existing dentition. They are designed to engage undercuts to achieve retention, and accustom the patient to activation. Acclimation of the patient for fitting and removing clear aligners is the first objective of treatment. Aligner set #1 is worn all the time except when eating. Objectives are to: 1) fit each device on the entire arch; 2) seat the retention points into the undercuts; 3) continuously retain both appliances on the dentition; and 4) easily remove them when desired. Patients and their parents (*if minors*) are instructed to clean aligners regularly, protect them in the carrier during meals, and keep them stored any time they are not in the mouth. In addition, patients are advised that the first aligners are to prepare them for the very important second stage when the attachments are bonded on the dentition. Most are excited and eagerly await the next visit when the attachments are installed.

The second overlay is a template with voids (*negative relief areas*) on the surfaces of teeth that correspond to the site and shape of each attachment. After the treatment plan is completed and the required attachments are digitally fitted on the dentition, templates are constructed as overlay appliances for the precise installation of attachments. The third overlay set (*Aligners #2*) are appliances designed to fully engage all the attachments and apply about 0.25mm of activation to begin aligning displaced teeth.

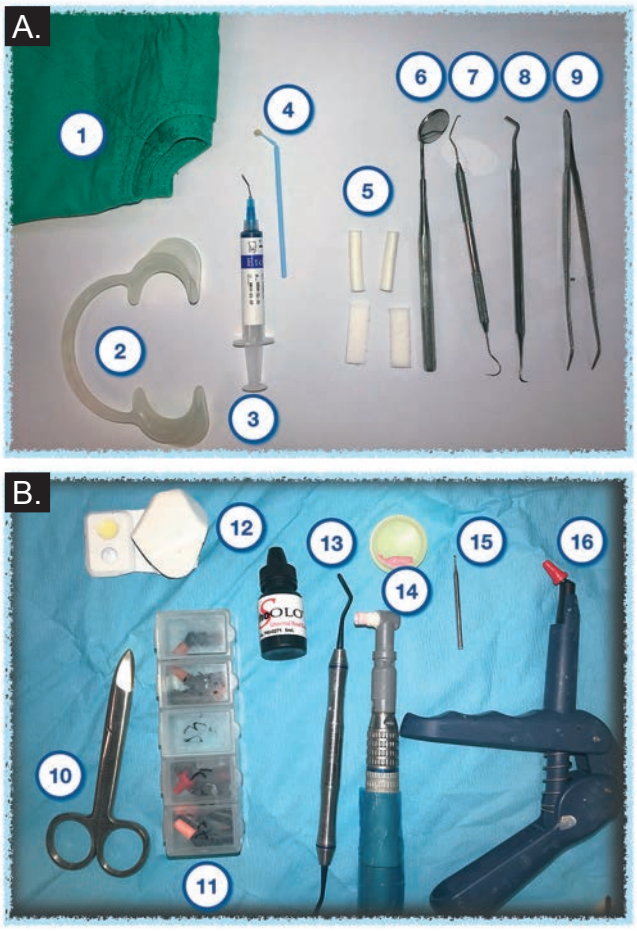

Fig. 2:

A. Doctor's chair-side desktop:

(1) Hole-towel
(2) Retractor
(3) Etching gel
(4) Small cotton wool stick
(5) Cotton rolls
(6) Mirror
(7) Probe
(8) Scaler
(9) Tweezers

B. Assistant's worktable:

(10) Scissors
(11) Differently shaded resin capsules (Tetric N-Ceram®)
(12) Container for the bonding agent (primer): OptiBond® Solo Plus™
(13) Composite resin instrument
(14) Rubber cup and pumice paste
(15) Low-speed round bur (1mm diameter)
(16) Resin feed gun with resin capsule

Attachment Installation

Efficiently bonding attachments is an important step in the treatment process. Precise and efficient bonding of the attachments is a high priority. Beethoven Orthodontic Center developed a standard protocol for achieving attachment goals.[3,4] The purpose of this report is to provide a step-by-step instruction for efficiently bonding attachments on all teeth as needed in about 12-15 minutes. Clinical experience has perfected this important process for beginning aligner treatment.

Pre-Bonding Phase

Once patients have accomplished the acclimation objectives with the first set of aligners, bonding of attachments is the next procedure.

1. Bonding Tray Set-Up

- ***Doctor's Chair-Side Desktop:*** Hole-towel, retractor, etching gel, bonding agent, cotton rolls, mirror, probe, scaler, and tweezers (*Fig. 2A*)
- ***Assistant's Work Area:*** Scissors, shaded resin capsules (*Tetric N-Ceram®, Invoclar Vivadent AG, Füstentum, Liechtenstein*), bonding agent (*OptiBond® Solo Plus™, Kerr Corp., Brea CA*), composite resin instruments, rubber cup, pumice paste, low-speed round bur, and resin feed gun with resin capsule (*Fig. 2B*)

2. Marking Templates and Stage 2 Aligners

Referring to the Invisalign® Treatment Overview sheet,[5,6] assistants confirm the location and specifications for each attachment, and mark the outer surfaces of the template with an indelible pen to correspond to each attachment (*Figs. 3 and 4*). Then each attachment template is cut in half, between the central incisors, resulting in four templates: upper right (*UR*), upper left (*UL*), lower right (*LR*), and lower left (*LL*) (*Fig. 5*). After this segmentation procedure, an assistant again compares the attachments for each quadrant template to the treatment overview (*Fig. 4*). Attachment locations are similarly marked on the post-bonding set of aligner trays (*Aligners #2*) to confirm the type and size of each attachment prior to the bonding procedure. The doctor then tries in the post-bonding set of aligner trays (*#2*) in patient's mouth to check attachment positions relative to the treatment plan (*Fig. 4*). In effect, there are three checks of aligner positions and specifications according to the treatment overview: two by the assistant(*s*) and one by the doctor (*Figs. 3-5*). These multiple checks reduce chair time and mistakes by ensuring that all templates are correctly configured.

3. Isolation and Color-Matching

After explaining the attachment bonding process to the patient, the hole-towel and retractor are applied to isolate the teeth and reduce saliva contamination. The shade for the attachment composite is selected under ambient light conditions by the doctor using the color matching tabs (*shade guides*) (*Fig. 6*).

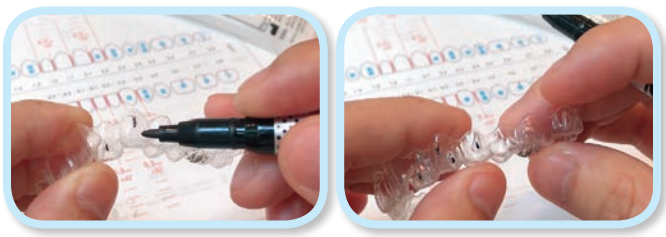

Fig. 3:
Marking the outer surface of each attachment window with a black marker pen

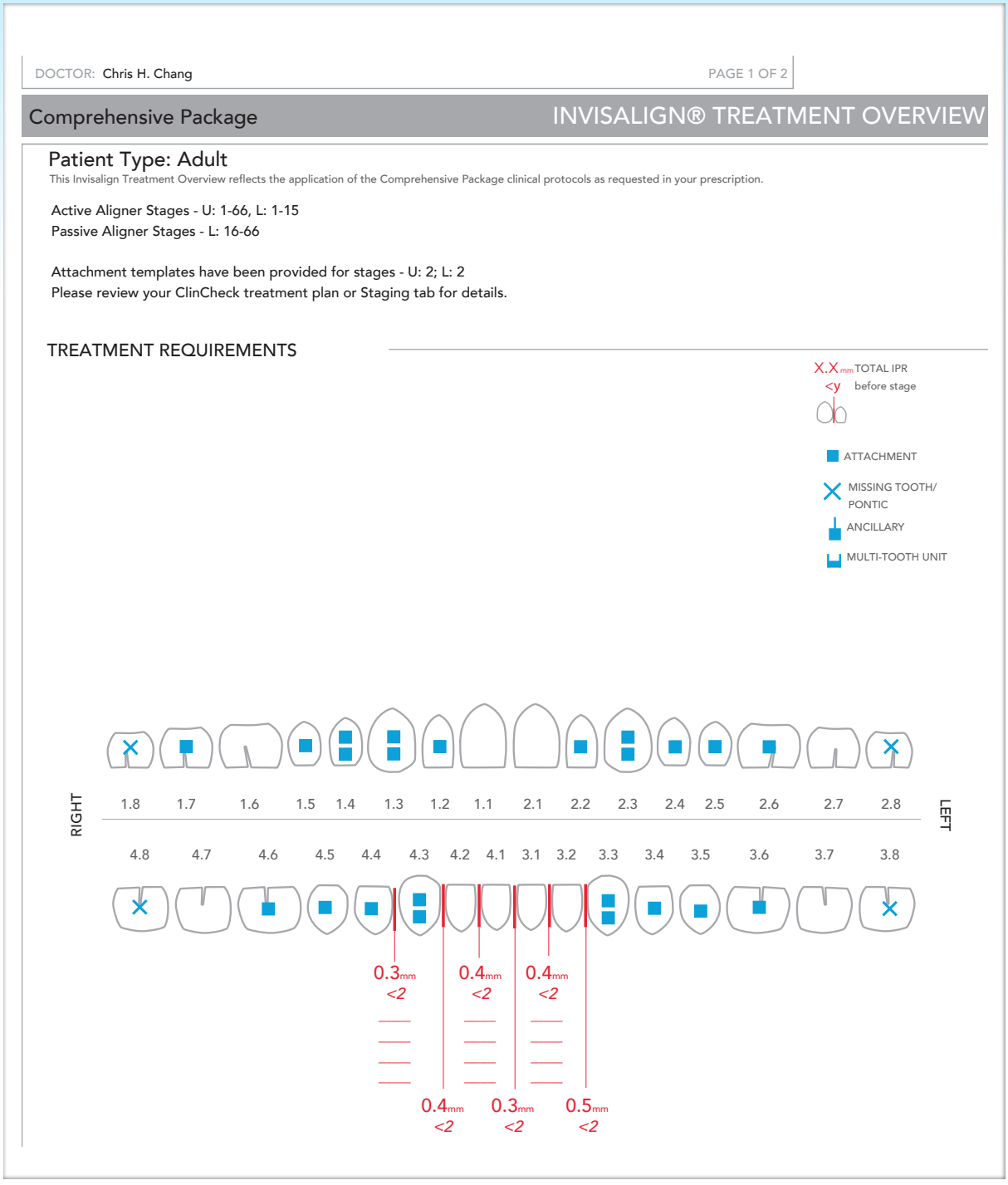

Fig. 4: Invisalign® Treatment Overview

The document is downloaded from the Invisalign ClinCheck®. It summarizes the position, type, size, and shape of each attachment, as well as the location and quantity for interproximal reduction (IPR).

"Active Aligner Stages" are the stages in which there is active force to the dentition. Every active aligner is a little different in shape to the previous aligner. Therefore, patient can feel the force when replacing an active aligner with a new one. In this figure, the active aligner stages of upper dentition is from stage #1 to the last stage of #66, whereas the active aligner stages of lower dentition is from stage #1 to #15. "Passive Aligner Stages" are the stages in which there is no force to the dentition. Passive aligners are for retention purpose only, and patient cannot feel any force when wearing passive aligners. In this figure, there is no passive aligner stage prescribed to the upper dentition and the passive aligner stages of lower dentition is from #16 to #66.

When the doctor prescribes the use of "power arm", the Treatment Overview sheet will show a symbol "Ancillary" on the corresponding tooth.

Fig. 5:
Prior to try-in, templates for bonding each arch are sectioned at the midline which results in four quadrant trays that are more convenient for clinical use.

Fig. 6:
Color-matching with shade guides helps produce inconspicuous attachments.

Bonding Phase

(1) Polish all enamel surfaces in both arches with pumice paste and rinse thoroughly.

(2) Try in the respective template for each quadrant. Ensure that they snap into place and fit properly. Fitting and retention problems may occur in the most crowded areas resulting in displacement on either end of the template. Note any fitting problems (*Fig. 7*) so they can be addressed at the time of bonding by applying pressure with a finger or instrument to achieve an optimal fit. Also, try in the post-attachment aligners (#2) to ensure a proper fit.

Fig. 7:
Fitting problem (yellow arrow) of the UL template occurs in the central incisor area which is the most crowded and irregular aspect of the arch.

NB: During this step, the doctor must again check the specification and location for each attachment by comparing template marks to the Treatment Overview sheet (*Fig. 3*). After triple-checking the templates (*twice by the assistant and once by the doctor*), the assistant then fills the attachment windows (*reliefs*) with composite resin.

(3) Use the marked post-attachment aligners and the doctor's chair-side laptop computer to identify areas of enamel requiring etching. Spot etch only the area to be bonded with a 37% phosphoric acid gel for enamel, or hydrofluoric acid for porcelain (*Fig. 8*). Thoroughly rinse with water and dry. The etched areas should have a frosty appearance (*Fig. 9*). Insert cotton rolls between the teeth and tongue for saliva control. Apply the bonding agent (*primer*): OptiBond® Solo Plus™, but do not apply the curing light.

(4) Load the shade-matched composite into the windows of the attachment template, slightly overfilling each area (*Fig. 10*).

Fig. 8:
Acid-etching according to the marked areas on the template is accomplished for natural enamel with 37% phosphoric acid gel for 30 seconds, and for porcelain surfaces with hydrofluoric acid for 60 seconds.

Fig. 9:
After rinsing with water and air drying, an etched enamel surface has a frosty (satin) appearance.

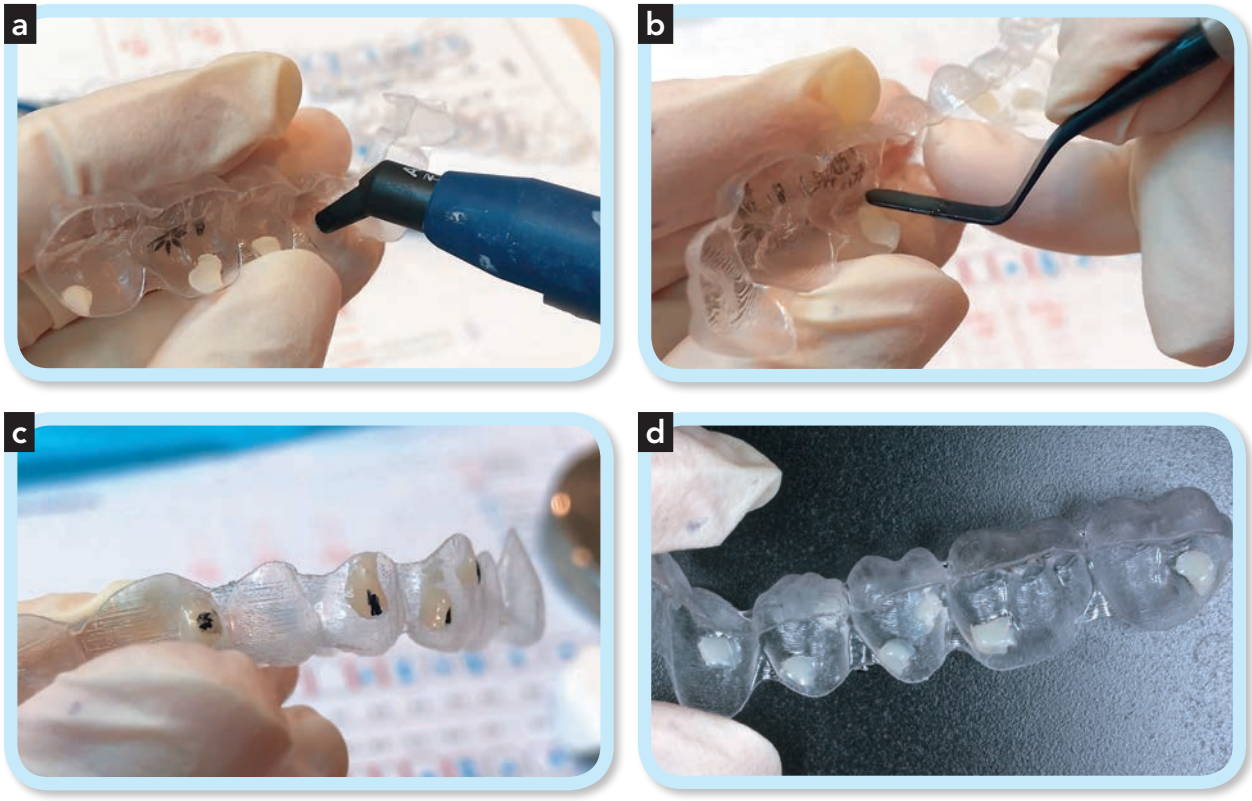

Fig. 10:
(a) Load composite resin into each attachment relief (window) with a resin-feeding gun.
(b) Adapt the resin into each window with a composite spatula.
(c) Check the buccal surfaces of the template to confirm a complete fill for each window.
(d) The lingual surface for each filled window should be slightly overfilled (convex).

NB: To improve efficiency, the doctor performs the etching procedure (*Fig. 8*) at the same time the assistant loads composite into the template windows (*Fig. 10*).

(5) After air blowing the uncured primer to a thin layer on each tooth, the UL and LL templates loaded with composite resin are seated in sequence. Then the patient bites on a cotton roll to seat the templates, i.e. tightly adapt the templates to the surfaces of the teeth (*Fig. 11*).

NB: Particularly for severely crowded incisors, a gap between the template and the surfaces of the teeth may occur after the patient bites on the cotton roll (*Fig. 11*). The problem is best resolved by pressing the fingers or an instrument to seat as much as possible the distorted section of the template prior to applying the curing light (*Fig. 12*).

(6) After the bonding procedure is completed for all four quadrants, additional irradiation with the curing light from all angles is necessary to ensure that primer and composite resin are completely cured.

Fig. 11:
After coating each etched attachment area with primer, the resin-filled trays are seated on the two left quadrants, and the patient bites on a cotton roll to ensure a good fit to tooth surfaces.

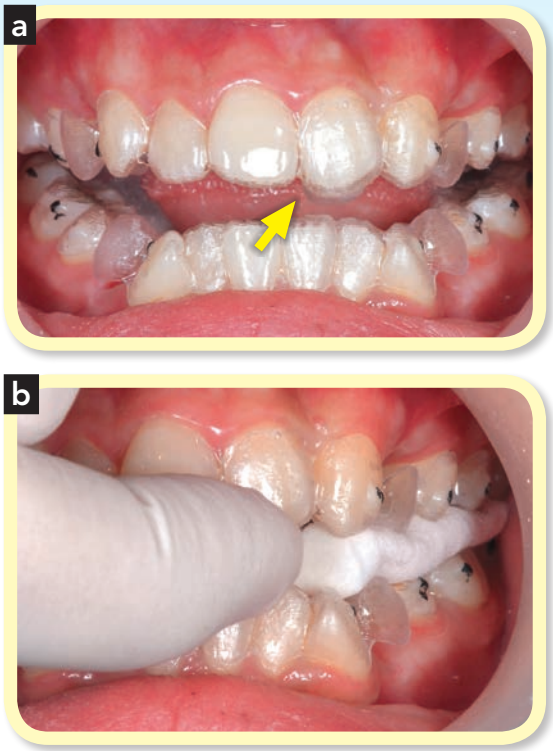

Fig. 12:
(a) A problem with the fit of the UL template was noticed at the try-in (yellow arrow). It must be corrected with finger or instrument pressure prior to curing the resin.
(b) The patient continues to bite on a cotton roll, while an instrument or finger is used to press the ill-fitting area so that it conforms properly to the surfaces of the teeth prior to utilizing the curing light.

Post-Bonding Phase

(1) After curing is complete, use a large hook-type scaler to dislodge the distal ends of the template on the lingual surface, and then carefully remove it to the buccal to avoid damaging the template or attachments (*Fig. 13*). The templates are removed sequentially and properly stored. They may be needed when replacing or repairing an attachment(s) during treatment.

NB: Keep the templates in the patient's Invisalign® treatment box. The attachment templates should never be given to the patient.

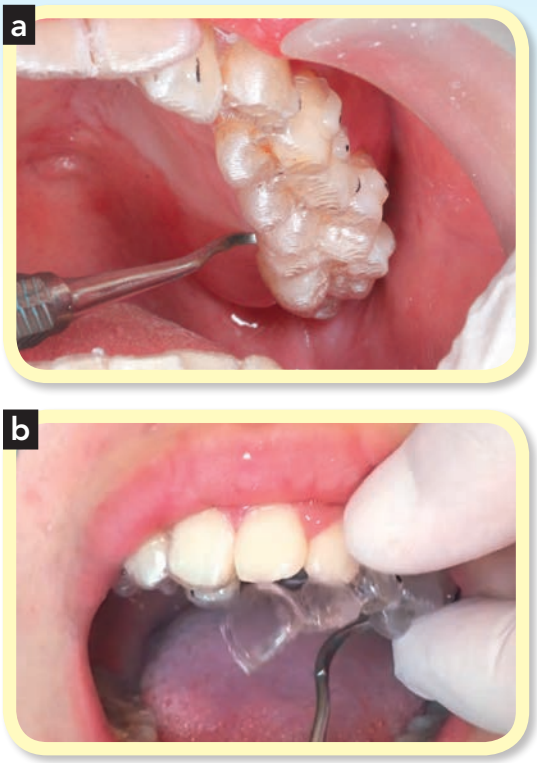

Fig. 13:
(a) After the composite is completely cured, use a large scaler to dislodge the palatal or lingual posterior surface of each template.
(b) Protect the cheeks and lips with the operator's fingers when the attachment template is gently rotated to the buccal and removed from the mouth.

(2) Clean all excess flash and residual bonding resin from around the attachments with a small round bur in a straight handpick (*Fig. 14*). Dental floss is effective for removing excess resin or composite from interproximal areas.

NB: Rotate the bur at a slow speed with blown air to clear excess resin as it is removed. To more easily distinguish the margin of each attachment, avoid water irrigation. Never touch the active surfaces of optimized attachments (*Fig. 15*) because their shape and orientation are critical for the planned treatment objectives.

Fig. 14:
Clean flash and residual bonding resin around each attachment with an 1mm diameter round bur in a straight handpiece. Avoid water-cooling to better visualize the margins of the attachments. Remove excess interproximal resin with dental floss.

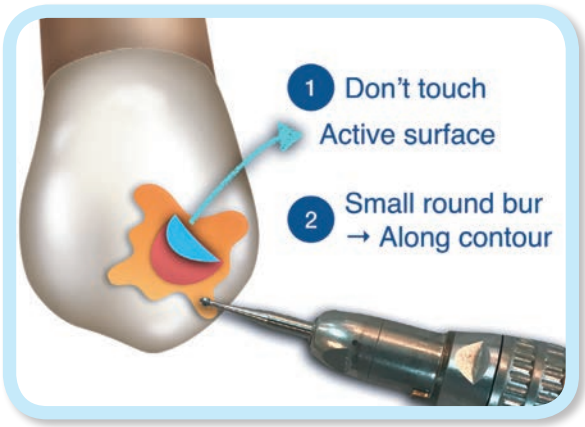

Fig. 15:
Avoid contacting the active surfaces of optimized attachments.

(3) Instruct the patient to completely engage all attachments when the post-attachment aligners are seated. Emphasize proper hygiene for the aligners and all enamel surfaces (*Fig. 16*). White spots are much less common for aligner compared to fixed appliance treatment, but placing aligners over teeth coated with plaque can result in generalized decalcification.[7]

Discussion

Precise placement of attachments helps ensure optimal tooth movement as prescribed in ClinCheck®. This is probably the most important step for achieving desired outcomes.[8] The standard bonding procedure for attachments at Beethoven Orthodontic Center involves multiple checks by different personnel (*Figs. 3, 5-7*) to ensure adherence to the specification for each attachment: shape (*type*), shade, relative prominence, and location. Furthermore, excessive humidity (*moisture contamination*) is controlled with cheek and lip retraction and lingual cotton rolls to isolate the tongue. These are important steps for achieving optimal polymerization, bond strength, and desired dimensions for each attachment.[9]

Conclusions

Attachments bonded with this established procedure facilitate the patient and dental team to enjoy a highly effective and relatively comfortable treatment experience. A full-mouth attachment bonding procedure can be accomplished in 12-15 minutes. This approach for rapidly and precisely bonding all attachments optimizes the efficiency of treatment to reduce chair time and improve outcomes.[10]

Acknowledgements

Thanks to Dr. Rungsi Thavarungkul for the delicate, original illustrations and to Mr. Paul Head for proof-reading this article.

Fig. 16:
An upper panel of three intra-oral photographs reveals the original malocclusion. A similar lower panel shows the dentition after attachments are bonded and Aligner set #2 are seated to activate alignment.

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張慧男醫師榮獲美國矯正學會期刊最佳案例獎

獲北美地區最大中文報紙-世界日報 World Journal 報導

記者王全秀子/橙縣報導

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華人團隊首獲殊榮

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張慧男所領導的貝多芬團隊為華人首次獲選的治療團隊，獲得該項殊榮受到肯定。

張慧男在印地安那大學取得矯正博士學位後，一直致力臨床治療和專業教學的工作。他熱愛分享，寫作和演講，不僅將實務案例出版在英文的專業期刊上，也領導貝多芬團隊的醫師們，將案例製作成簡報影片發表在各大社群媒體上，與來自世界各地的專業人士交流。

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▲ 華裔醫師張慧男（前排左二）與專業人士交流。

B3 | 美西要聞(二)　世界日報　worldjournal.com　2019年6月9日 星期日 SUNDAY, JUNE 9, 2019

張慧男獲美國矯正學會期刊最佳案例獎

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2020 一年一度 Damon Master Program in Hsinchu

全新的 2020 貝多芬高效 Damon 矯正大師系列課程是由國際知名講師張慧男醫師親自規劃及授課，課程特色強調由臨床病例帶動診斷、分析、治療計畫擬定與執行技巧。此外，透過數位影片反覆觀看，課堂助教協助操作，以及診間臨床見習，讓學員在短時間能快速上手，感染「熱愛矯正學，熱愛學矯正」的熱情。

名額有限，一年僅有一次機會在台完整體驗 Damon 矯正大師課程，錯過只能等明年囉！

時間：週四全天（9 am - 5 pm），每月一次。
地點：金牛頓藝術科技（新竹市建中一路 25 號 2 樓）

Module 1: Hands-on - **4/23, 5/7（擇一）**
1. Selecting your ideal first case
2. Bonding position
3. Bonding + BT + Ceph tracing
4. TADs + space closing + hook + spring
5. Finishing bending & fixed retainer

Practice: Clinical photography

Module 2 - **5/21**
1. Four stages of efficient orthodontic treatment
2. Simple and effective anchorage system
3. Extraction vs. Non-extraction analysis
4. Case consultation & discussion

Practice: Patient photo management

Module 3 - **6/4**
1. Damon diagnosis & fine-tuning
2. Checklist for finishing
3. Case consultation & discussion

Practice: Ceph tracing

Module 4 - **7/2**
1. Excellent finishing & case report demo
2. Retention & relapse: case demo
3. Case consultation & discussion
4. Hands-on: Presentation demo

Practice: Ceph superimposition & Measurement

Module 5 - **8/20**
1. Orthodontic biomechanics & diagnostic analysis
2. Soft & hard tissue diagnostic analysis
3. Children & adult orthodontics and diagnostic analysis
4. Case consultation & discussion

Practice: Morph

Chairside observation - **（TBA）**
Chairside observation & clinic management

Computer training (Mac): 1:30 - 2:30 pm

Module 6 - **9/24**
1. Crowding: Extraction vs. Non-extraction
2. Upper impaction
3. Lower impaction
4. Case consultation & discussion

Topic: Interdisciplinary approach

Module 7 - **10/15**
1. Missing teeth: Anterior vs. Posterior
2. Crossbite: Anterior vs. Posterior
3. Case consultation & discussion

Topic: Modfied VISTA

Module 8 - **11/19**
1. Open bite- High angle & Deep bite - Low angle
2. ABO DI, CRE workshop
3. Case consultation & discussion

Topic: Modified 2X4 appliance in ortho treatment

Module 9 - **12/17**
1. Gummy smile and canting
2. Esthetic finishing(transposition)
3. Case consultation & discussion

Topic: Early orthodontic treatment

Module 10 - **2021/1/7**
1. Implant-ortho combined treatment
2. Interdisciplinary treatment-adult complex cases
3. Case consultation & discussion

Topic: Aligner orthdontics

Special lecture: 1:30-2:30 pm

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Towards a Contemporary and Reasoned Orthodontics: An Interview with Dr. Chris Chang

Introduction

This interview was conducted by Dr. Stéphane Renger before Dr. Chang's lecture in the annual Prestige Day of the French Society of Dento-Facial Orthopedics (SFODF) and was originally published in the Journal of French Orthodontics (L'Orthodontie Française) in 2018 in French.[1] *It was translated to English by Dr. Stéphane Renger and reprinted with permission. (J Digital Orthod 2020;59:78-88)*

Stéphane Renger: Dr. Chris Chang, on March 28th, 2019, you will be the prestigious speaker for the annual Prestige Day of the French Society of Dento-Facial Orthopedics (*SFODF*). It is a great honor for us that you accepted this invitation to share your experiences in orthodontics with French orthodontists. Before the event starts, we are happy to discuss various subjects and exchange some aspects of your work in order to get to know you better.

The Path Taken

Stéphane Renger: First, could you please describe the first step that guided you throug your incredible professional career?

Chris Chang: I was born in a small humble village in the countryside in Taiwan, and I had never really worn shoes before I started school. In the whole village, people only spoke a local dialect and I was not known for being a good student! The most important thing that I learned in primary school was not to make any trouble or get into trouble! At school, there was not much to learn, so I had time to learn on my own, for example, to kill and skin frogs! This was the start of my self-teaching process, which continues until now: how to identify and solve problems. I have no memory of learning anything in primary school, but I do remember I was the "*Head of Cleaning.*" I always aspired to be the class leader, but my teacher insisted that I remain the head of hygiene, which I obviously must have excelled in!

My education in junior and senior high school, however, was very different. I attended a rigorous Catholic private school where most of the students from the area were all much smarter than I was. This is the place where my personality was shaped and formed, and it was when I became very disciplined (*Fig. 1*).

Stéphane Renger,
Member of the Board of Directors,
The French Society of Dento-Facial Orthopedics

Stéphane Renger: What was the motivation that made you choose the career in orthodontics?

Chris Chang: The motivation to become an orthodontist was a bit special. At first, I was not really interested in becoming a dentist, even though I had attended dental school. I had applied for a teaching position in the anatomy department, but, when my prosthodontics professor found out, he wouldn't allow me to continue on this path. He explained to me that I had a gift and talent in orthodontics. I had no real interest in learning orthodontics, due to the way it was taught, but my professor told me he would make it happen!

So I started studying Dr. Angle's publications and attending Charlie Burstone's conferences of biomechanics where I learned that preparation was the key to success! I was well-prepared for his conferences. I understood what he was talking about and I could even answer questions from other participants.

Fig. 1: 12-year-old Dr. Chris Chang in junior high school

The last hurdle to overcome was trying to convince my father to pay for my tuition fees in the United States, which was almost the entire life savings of my working-class family.

Stéphane Renger: What motivates you to be so active in your profession?

Chris Chang: I think that it is a mixture of my background, education, the difficulties I encountered, and the results I obtained. All of these are the engine of my professional career and my enthusiasm for teaching. As I found that it is so difficult to become an orthodontist, I've made a vow to pass on the knowledge which I finally understand, and to make it easier for others to acquire it.

Stéphane Renger: Did you have or do you still have mentors, people who help or support you in your professional career? If so, what did you learn from them?

Chris Chang: My first mentor is a Taiwanese doctor called John Lin (*Fig. 2B, left*). He has continued to

Fig. 2:
Dr. Chris Chang with his mentors: Dr. Charlie Burstone (A), Dr. John Lin (B, left), Dr. Eugene Roberts (B, center), Dr. Dwight Damon (C, center), and Sandra Diver (C, right)

inspire me even till today. He has taught me two very important things: the passion for learning and the passion for teaching.

Charlie Burstone (*Fig. 2A*) is another mentor of mine, who taught me how to appreciate the beauty of biomechanics.

Gene Roberts (*Fig. 2B, center*) was my mentor at Indiana University and is still my mentor. Most importantly, I refer to him as my godfather. This great man has taught me virtually everything I have needed to survive in this great profession.

Dwight Damon (*Fig. 2C, center*) is another mentor who has opened my eyes to the possibilities of using new techniques and a different philosophy towards old problems.

Last but not least, Sandra Diver (*Fig. 2C, right*) has given me the opportunities to speak to a large audience and has coached me to be able to lecture all around the world.

This list could go on forever, as I think that everyone can be my teacher, but those listed above are of the most importance.

Furthermore, please have a look at my YouTube video entitled "*Three Life Lessons*" and this will help you to further understand my philosophies on learning and life (*Link 1**).

Stéphane Renger: Do you also have mentees? I read your journal, Journal of Digital Orthodontics (*JDO*), with free internet access. There are many young orthodontists working with you and publishing articles regularly. Are they your students? Are you working with them?

Chris Chang: Yes, I have many mentees, and most of them work together with me in the same practice. However, I love to teach doctors who are passionate about learning, and I also like to make it easier for

** All videos mentioned are linked at the end of this interview.*

them to excel in our beloved profession.

I am really happy to see my students publishing so frequently with such enthusiasm.

Temporary Anchorage Devices (TADs)

Stéphane Renger: TADs or, more specifically, miniscrews (*Fig. 3*), have become very popular among orthodontists. When appropriately used, they improve the quality of treatment and open up new treatment alternatives.

However, it has been reported that the average failure rate of the miniscrews is 16.4%.[2] Such rates discourage many orthodontists and prevent them from taking advantage of these devices.

Chris Chang: Please take a look at my publication on the success rate of TADs, "*A Retrospective Study of the Extra-alveolar Screw Placement on Buccal Shelves.*"[3] The failure rate is actually very low (7%). This has to do with the methods.

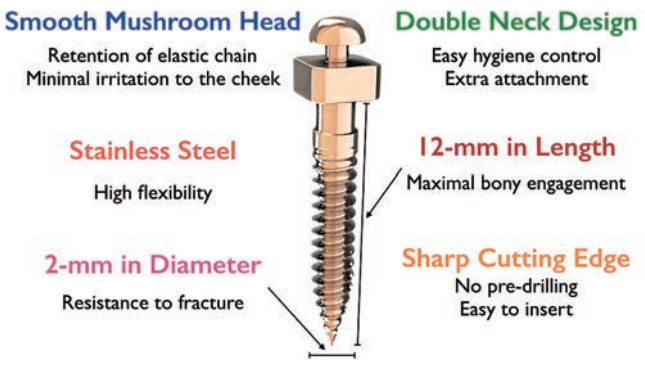

Fig. 3:
Special design of the orthodontic bone screw (2x12-mm stainless steel)

Stéphane Renger: You did a Ph.D. in bone physiology, and you published a great number of articles on this subject. I guess your success rate is much higher. Could you please give us, on the base of your expertise, a few advice to improve the success rate and to help convince orthodontists to use them?

Chris Chang: My success rate is about 93%. More details are illustrated in my article, "*Primary failure rate for 1680 extra-alveolar mandibular buccal shelf mini-screws placed in movable mucosa or attached gingiva.*"[4]

The proper method is the key. You will be able to find the answers in the YouTube video titled "*Failure Rate for Buccal Shelf Screws*" (*Link 2*). Everything is there!

Stéphane Renger: Concerning the primary stability of TADs, the bone-implant contact is the key point. Do you think that TADs are partially osseointegrated? Is there any sign of osseointegration after a long period in the mouth?

Chris Chang: No, I use non-osseointegrated screws made of stainless steel. My primary stability is based on mechanical locking with the bone, so the key is bone density.

Stéphane Renger: Ideally, miniscrews should be designed to enhance their holding in the bone.

"*Design is not just what it looks like and feels like. Design is how it works,*" said Steve Jobs.

Could you tell us what would be the qualities of TADs in terms of design and material?

Do your OBS screws have a special design related to diameter and length, thread and shaft design, fluting, surface treatment, etc.?

Chris Chang: This is a very good question. I can talk to you about this for hours.

My OBS screws have all of the mentioned features (*Fig. 3*). Please look at my YouTube video titled "*OBS TAD applications*" (*Part 1: Link 3; Part 2: Link 4*).

It took me 5 years to design and test this screw and, according to my experience, this is the best weapon that I have ever had.

Most screws are designed by engineers, but mine have been designed by a practicing orthodontist and tested by the same experienced orthodontist, which has helped to eliminate all possible variabilities.

Stéphane Renger: Do you always use self-drilling screws? Hung et al.[5] recently evaluated that initial drilling reduces the associated trauma when inserting the miniscrews into the bone site.

How do you control your insertion torque value during insertion and removal?

Do you believe that insertion torque is the key to TADs success?

Chris Chang: I always use self-drilling screws, 100% of the time. Self-drilling gives you the sense of bone quality. Initial trauma is not as important as bone quality. One has to learn to follow one's instincts. The success rate of 93% justifies my gut feeling!

If the bone quality is not good enough, the answer is easy: find another place with better bone quality!

Stéphane Renger: As previously indicated, the anchorage of a miniscrew depends on its interaction with the surrounding bone into which it has been inserted. In your experience, what are the best insertion sites?

Chris Chang: The best insertion sites are the infra-zygomatic crest (*IZC*) for the upper arch (*Fig. 4*) and the mandibular buccal shelf (*MBS*) for the lower arch (*Fig. 5*).

Stéphane Renger: How do you evaluate cortical bone thickness before insertion? In which cases do you consider that a CBCT is needed?

Chris Chang: I don't need to evaluate the cortical bone thickness. I can sense it during insertion. I only use a CBCT after insertion, to check how much cortical bone has been engaged and/or to check for sinus perforation.

Stéphane Renger: Do you use TADs in most of your cases? What is the percentage of cases you use TADs in young patients and adults?

Chris Chang: No. When the case needs it, I use it, but only if there is no other minimally invasive alternatives.

My goal is to be as minimally invasive as possible. I don't use OBS screws just because I designed it and

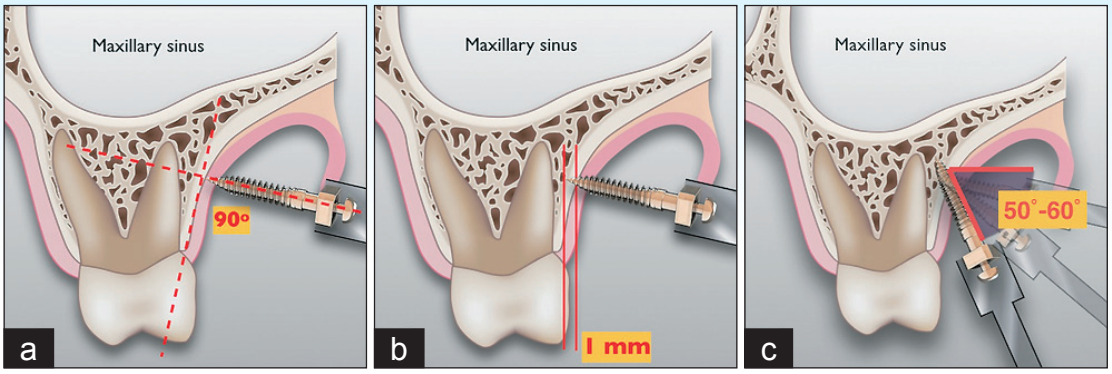

Fig. 4:
(a) 90° orientation of the IZC screws is shown at the start of the installation procedure. (b) The approximately 1mm bone plate is penetrated on the buccal surface. (c) The axial inclination of the screws is progressively increased about 50-60° as it is screwed into place.

wish to sell more of them. I use them in about 30% of my young patient cases and about 45% of my adult cases.

When reading these percentages, please bear in mind that:

1. Asians tend to suffer more from crowding and bimaxillary protrusion than Caucasians.

2. Most of my cases have been referred to me, especially a lot of impaction cases, so my percentages tend to be higher than other orthodontists.

Stéphane Renger: I saw a beautiful case treated with a vertical miniscrew inserted in the mandible in your publication. You suggest inserting screws between the first and second molar with about 20°-30° angulation in the mandibular buccal shelf (*MBS*) region, and 5-7mm below the alveolar bone crest with a specific technique (*Fig. 5*).

Could you please explain how do you insert the miniscrews in these sites? What type of screws do you use and how to avoid any torsion, slippage of the screw, or injury of the soft tissues? Do you use (*digital*) surgical guide in some difficult cases?

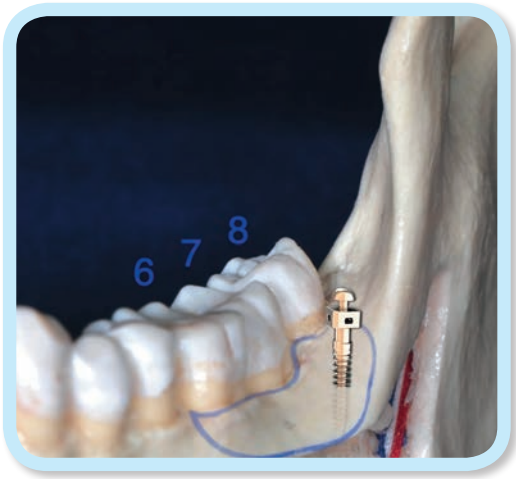

Fig. 5:
The best insertion site: mandibular buccal shelf (MBS) region for the lower arch

Chris Chang: It's easier to learn from videos than texts. Please have a look at my YouTube videos on how to put screws in anterior position, buccal shelf, and palate (*Links 5-7*). These show you how to use

the screws and tips for insertion. I have never used a digital surgical guide.

Stéphane Renger: Do you usually find enough labial bone to insert vertical miniscrews in maxillary buccal areas? If not, where are the ideal insertion sites?

Chris Chang: In 99% of my cases, I insert TADs in the IZC and the lower buccal shelf.

Stéphane Renger: In your opinion, is the palate a good insertion site?

Chris Chang: I rarely insert into the palate, as this irritates the patient's tongue and affects their speech. Orthodontics should be as minimally invasive and as comfortable for patients as possible.

Stéphane Renger: Do you insert the same type of screws under the mucosa (*for example, infra-zygomatic crest sites*)?

Chris Chang: Yes. The key is to stretch the mucosa when inserting so as not to tangle the mucosa.

Stéphane Renger: At which standpoint do you decide between "*en masse*" retraction of the entire maxillary dentition or sectorial retraction?

Chris Chang: I am a student of Charlie Burstone; therefore, I always do en masse retraction. I love Charlie!

Stéphane Renger: For these Class III patients with en masse retraction, in which cases could you anticipate a higher success rate or a higher risk of failure?

Chris Chang: For Class III non-extraction patients, I use whole arch distalization with MBS screws. If the lower incisors are flared out, this is an easy case. If the lower incisors are retroinclined at first, then it is a more difficult case. You need to use high torque brackets on lower incisors.

Stéphane Renger: It is common knowledge that it is more difficult to distalize molars in patients with hypodivergent faces: do you experience these difficulties?

Chris Chang: Yes, of course. However, fortunately short faces are not so common in Taiwan. Therefore, I seldom have such difficulties!

Stéphane Renger: While there are various reasons why orthodontists do not place their own miniscrews (*Buschang et al.*[6]), the most common reason is the risk of root damage. The risk of root damage was deemed to be more important than time, training, pain, or the availability of a kit. What are your views on these statements?

Chris Chang: To avoid root damage, I place the miniscrews in the IZC and MBS, outside of alveolar process, as there is plenty of bone in both areas, resulting in good anchorage and obviously no root damage. Besides, I use self-tapping screws, so if the screws were too close to the roots, both the patient and I would feel that, and the route of insertion can be changed.

Stéphane Renger: Before inserting miniscrews, the CBCT examination (*short field*) is recommended

if usual radiographic examinations show a risk of complications (*root proximity or variations in the root anatomy inadequate bone*). In which situations do you use this kind of examination prior to inserting your screws?

Chris Chang: I don't need a CBCT prior to starting the treatment; a visual check is sufficient. It really is an easy procedure once you know how to do it. However, I do use CBCT after insertion to check, for my own studies and research.

Stéphane Renger: You show us wonderful cases treated with IZC bone screws, which are extra-alveolar skeletal anchorages. They always stay under the soft tissues. What type of connections do you use between them and the dental units?

Chris Chang: I use power chains to connect the screws to the dental units for retraction and protraction cases (*Fig. 6*).

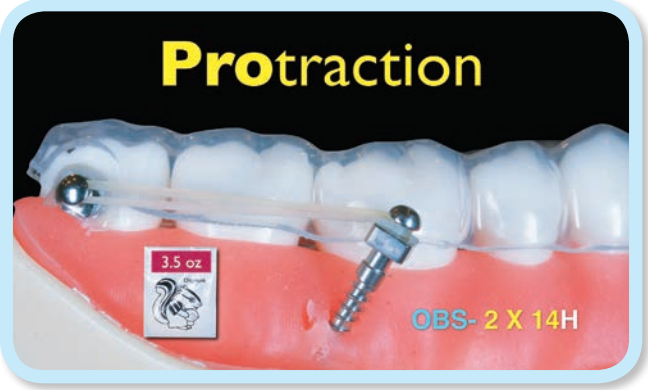

Fig. 6:
A screw is connected to the third molar by elastics (or power chains) in a protraction case.

Stéphane Renger: In case of connection with lever arms between IZC bone screws and dental units, how do you connect the lever arms to the head of the screw?

Chris Chang: I only use lever arms for impaction cases and these need to be designed to the force vector according to the specific situation of the impaction (*Figs. 7 and 8*).

Normally the vector would be outward, backward, and downward. I connect the lever arms into the 0.022 x 0.027" rectangular hole in the screw platform using a 0.019 x 0.025" stainless steel (SS) wire.

Stéphane Renger: Do you always do the surgery yourself or do you sometimes delegate to surgeons?

Chris Chang: If the case is simple, routine, and time is of the essence, I will sometimes delegate to other surgeons who work in my practice. If the case is a difficult case, then I will prefer to perform the surgery on my own.

Stéphane Renger: Is the percentage of extraction in Taiwan lower today than 20 years ago? Do you think that new technologies like TADs could explain the decrease of the percentage of extractions?

Chris Chang: Yes, because TADs can distalize the arch backward. Besides, the Damon system I use is very efficient for solving crowding, which, however, can sometimes procline the front teeth too much. TADs can prevent this side effect. Therefore, the Damon system and TADs are a wonderful combination.

Stéphane Renger: Dr. Chris Chang, you have had enormous experience and treated a considerable number of patients in your clinics, and the most important of which is your "*Beethoven Orthodontic Center*" in Taiwan. What are the most challenging cases in orthodontics in your practice?

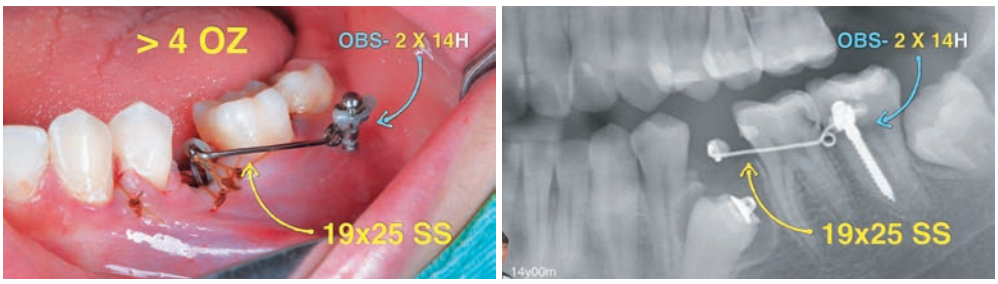

Fig. 7: A level arm used to treat a lower impaction case

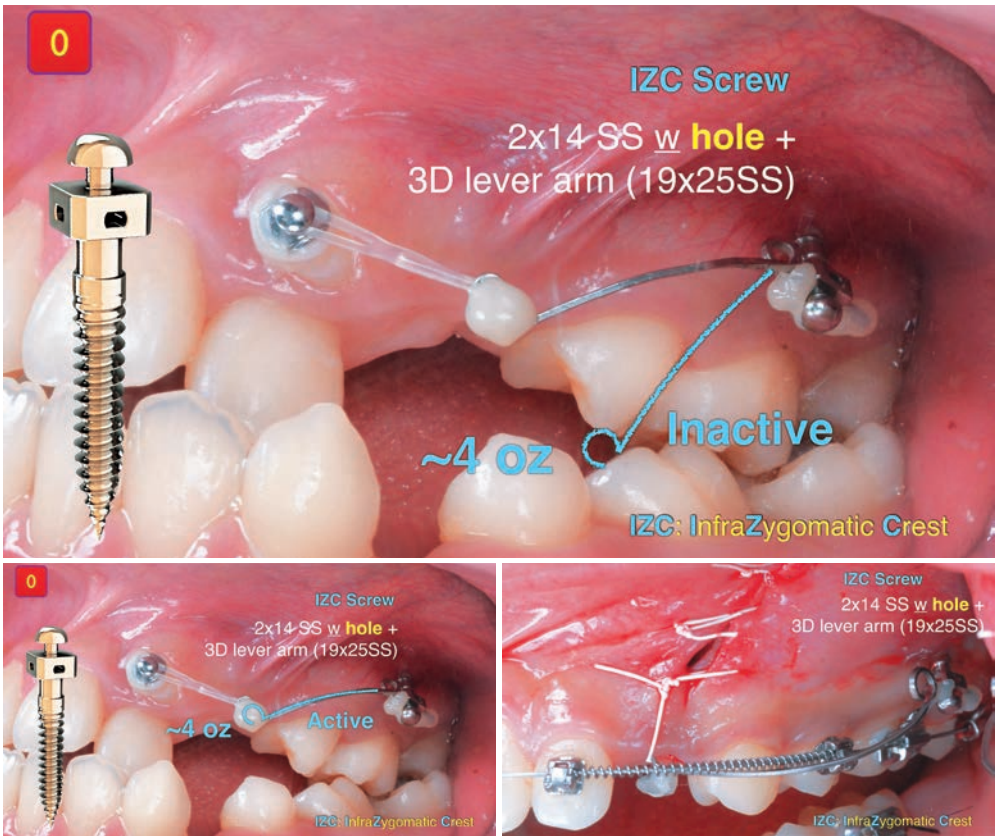

Fig. 8: A level arm used to treat an upper impaction case

Chris Chang: Currently, my most challenging case is answering your questions! Seriously, though, I think the most challenging cases are picky patients, unless they're beautiful ladies.

Stéphane Renger: Your YouTube video, "*Class III amazing case*" (*Link 8*), has more than 1.7 million views! It shows, for patients treated, the possibility of orthodontic correction that, at first sight, had to be treated combined with surgery (*Fig. 9*).

Do you think the use of TADs enlarges the scope of your treatment plans when you don't want to do extractions or orthognathic surgery?

Chris Chang: Of course. That's why I use them!

Stéphane Renger: In cases where the the treatment plans depends only on the use of TADs, how do you inform the patients that the treatment plan has to be changed in case of TADs failure?

Fig. 9:
"Amazing Class III Open Bite" on Youtube (Link 8) shows the treatment progress of a Class III case, which reaches over 1.7 million views.

Chris Chang: If you think you might face this issue, it is always better to inform the patient before starting the treatment. For me, it is not a big issue. I always tell the patient that I will try my best. I never make a definitive promise.

Looking Ahead

Stéphane Renger: Do you perform statistical reviews and for what purposes?

Chris Chang: I am currently conducting research on the failure rates of different miniscrews and the analysis of the factors that contribute to these failures. I hope this work will bear fruit and be useful to professionals who use skeletal anchorage to treat patients.

Stéphane Renger: How do you see our profession in the future? You often quote words from Steve Jobs, whose ultimate message to the world was "*your time is limited, so don't waste it living someone else's life. Don't be trapped by dogma - which is living with the results of other people's thinking ... Have the courage to follow your heart and intuition.*" How could you link this statement to your philosophy of treatment in orthodontics?

Chris Chang: The future is digital orthodontics. I apply this minimalist philosophy both in my private and professional life. With the help of digital orthodontics, I think it will be easier to treat our patients with the least invasive approach possible. I adhere to this minimalist philosophy by being as minimally invasive as possible for all my patients.

I think everyone should follow this wave - Digital Orthodontics - as well as everything that the digital world can bring us in general. Today, in my practice, I only use digital tools: the Insignia® system for fixed devices and Invisalign® for removable devices.

Stéphane Renger: Thank you very much, Dr. Chris Chang, for all your answers and all these beautiful references and links to many of your YouTube videos! It was a real pleasure to chat with you on this occasion.

Chris Chang: I hope I have answered all your questions well, while waiting to meet you all during the next SFODF Prestige Day in Paris on March 28, 2019!

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Links

1. Chris's 3 Life Lessons - https://youtu.be/1EWcvCr3KHQ
2. Failure Rate for Buccal Shelf Screws - https://youtu.be/kTSM6hS_iyg
3. IZC Screw - Angle Society 2017 Part 1 - https://youtu.be/u2nZf5dQyLM
4. OBS TAD applications Part 2 - https://youtu.be/FTgvqB1nrF4
5. How to Put OBS 1.5 at Anterior Position - https://youtu.be/UokxZIqle64
6. OBS-2. Buccal Shelf - https://youtu.be/EFoYex0KXS4
7. OBS-3. Palate - https://youtu.be/JQUdmIJDMyc
8. Amazing Class III Open Bite - https://youtu.be/LJO8Xmw_czA

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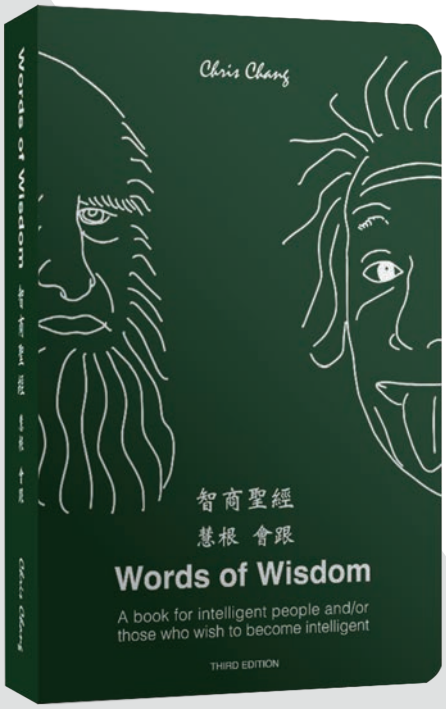

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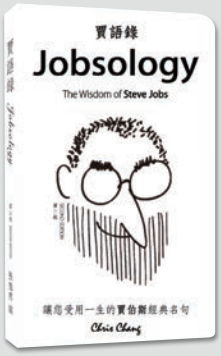

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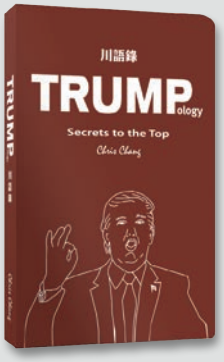

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Module 2 July 16 Thu (Webinar)

1. Simple and effective anchorage system
2. Extraction analysis
3. Non-extraction analysis

Module 3 Aug 6 Thu (Webinar)

1. Damon diagnosis & fine-tuning
2. Model & Ceph tracing demonstration
3. OBS model demonstration

Module 4 Sep 17 Thu (Webinar)

1. Excellent finishing & case report demo
2. Retention & relapse: case demo

Module 5 Oct 29 Thu (Webinar)

1. Orthodontic biomechanics & diagnostic analysis
2. Soft & hard tissue diagnostic analysis
3. Children & adult orthodontics and diagnostic analysis

Module 6 Nov 26 Thu (Webinar)

1. Crowding: Extraction vs. Non-extraction
2. Upper impaction
3. Lower impaction

Module 7 Dec 31 Thu (Webinar)

1. Missing teeth: Anterior vs. Posterior
2. Crossbite: Anterior vs. Posterior
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Module 8 Jan 14 Thu (Webinar)

1. Deep bite- Low angle
2. Gummy smile and canting
3. Esthetic finishing (transposition)

Module 9 Mar 11 Thu (Webinar)

1. Implant-ortho combined treatment
2. Interdisciplinary treatment-adult complex cases

Module 10 Apr 15-17 Thu-Sat

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張慧男醫師於美國矯正學會年會演講獲 99.73% 評鑑獨具價值

Dr. Chris Chang Rated Valuable by 99.73% of the Attendees at the AAO 2020 Virtual Conference

撰稿 Author
余承勳 Chester Yu*

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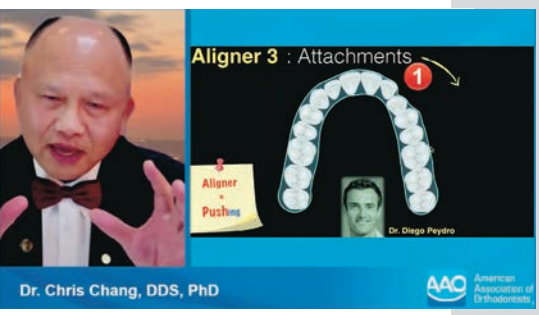
* 編輯主委，數位矯正期刊
Desk Editor, Journal of Digital orthodontics

原預計今年五月於美國亞特蘭大舉行的全世界最盛大矯正會議——美國齒顎矯正學會年會（AAO Annual Meeting），因新冠病毒疫情影響，史上第一次改為線上會議，吸引了超過 11,000 名世界各地的矯正醫師一起共襄盛舉。在所有 12 位受邀於臨床專題演講的醫師中，由張慧男醫師演講打頭陣，揭開本次會議序幕。

張醫師本次詳細闡述了目前流行的隱形牙套矯正，並搭配其專長的骨釘結合治療。針對此長達一個小時的演講內容，會後有 3,005 名聽眾留下回饋，當中有 96.7% 認為張醫師表現傑出，整體滿意度高達 98.84%，99.23% 的聽眾認為內容具有實際效用，更有 99.73% 評鑑此演講獨具價值！張醫師演講的評價幾乎達到人人滿意的創舉，身為一位台灣醫師，能夠站在此全世界最大的矯正舞台上，並達到幾乎滿分的回饋，實屬台灣之光！

美國矯正學會會長 Christopher A. Roberts 與教育委員 Melissa McCulloch 都特別於會後對張醫師表達感謝之意，Melissa 更進一步提到她特別喜愛下面這則聽眾的回饋：「我認為張醫師的智慧與技藝最具價值，演講的內容可以直接應用在診間臨床……以及人生上！」

除了來自世界各地友人的正面回饋外，會後也收到不同國家的演講邀約。張醫師一直在做的，就是透過演講、教育的方式，將畢生所學的知識傳承下去，把好的方法用在病人身上，就如張醫師好友 Sandra Diver 所說的：「你已經在很多方面改變了臨床矯正學的面貌。」



張慧男醫師 2020 AAO 線上年會演講的觀眾視角。

The audiences' view of the Dr. Chris Chang's lecture in the 2020 AAO Annual Virtual Meeting.

張慧男醫師 與 AAO 前會長 Gary Inman 於 2020 AAO 線上年會演講前現場設置。

Dr. Chris Chang setting up before the 2020 AAO Annual Virtual Meeting with AAO president, Dr. Gary Inman.

Under the influence of the COVID-19 pandemic, the 2020 AAO (American Association of Orthodontics) Annual Meeting, which was to take place this May in Atlanta, GA, USA, became the first ever AAO meeting gone virtual. Being the most outstanding gathering in the orthodontic field, the virtual conference attracted over 11,000 orthodontists from over the world. Among the 12 doctors invited to speak, Dr. Chris Chang was the one to take the lead and opened the conference.

In his talk, Dr. Chang elaborated on the in-trend clear aligner treatment in contemporary orthodontics, as well as its combined application with bone screws, which Dr. Chang has his mastery in. The post-session evaluation was collected from 3,005 participants, with 96.7% rating Dr. Chang as an excellent speaker, 98.84% finding their personal objectives for participation satisfied, 99.23% finding the teaching method effective, and 99.73% rating the talk as valuable. As a doctor from Taiwan, it is truly an honorable achievement to be able to speak in front of such an outstanding audience, not to mention to receive a near-perfect evaluation!

The President of the AAO, Dr. Christopher A. Roberts, and their Education Specialist, Melissa McCulloch, have both communicated in person their appreciation to Dr. Chang. Furthermore, Melissa McCulloch specifically pointed out one piece of feedback from the audience that touched her heart, which says, "I found Dr. Chang's wisdom and skill most valuable. The information was directly transferable to clinical practice … and to life!"

In addition to receiving positive feedback from friends around the world, Dr. Chang was also flattered by the incoming invitations to present internationally. Through speeches and lectures, Dr. Chang wishes to pass on the knowledge that he has acquired throughout his career, and to ensure that patients are treated with good techniques. As one of his mentors, Sandra Diver, once said to him, "You have changed in so many ways the face of clinical orthodontics," this is exactly what Dr. Chang has dedicated himself to achieve.

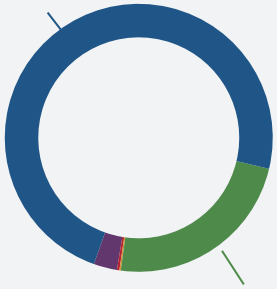
99.73%
Find the lecture valuable

99.23%
Note the lecture effective

Satisfaction rate
98.84%

96.70%
Rate the speaker excellent/good

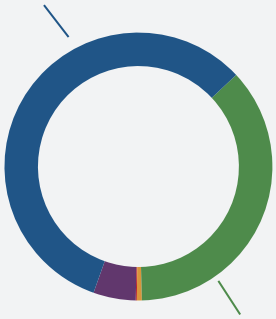
73.27% excellent



23.43% good

94.15%
Consider the lecture enhance their current knowledge or skill

57.58% excellent



36.57% good

Products

Dental Products Essential Kit

NEW

Double Retractors 2.0 Autoclavable!

Double Retractors x2, Black Board x2

While keeping the same lip & cheek two-way design, the new Double Retractors 2.0 is upgraded to medical grade PPSU. This new material is more durable, resilient and most importantly, autoclavable. Its smooth edges and translucent quality make it the best aid to perfect intra-oral photography.

Stainless Steel Mirror

Strong, durable stainless steel, autoclave-proof, the specially designed size, shape and thickness ensure maximum intra-oral view without sacrificing patient comfort.

Bite Turbo 2.0

Handle x1, BT molds x6, BT extended molds x6, Button molds x6

A simple but power set of tools to correct severe deep bite and cross efficiently. The bite turbos and lingual button molds, made with silicon and filled with flowable resin, can be reused and adjusted depending on treatment progress. The longer one allows you to solve all kinds of deep bite and large horizontal overjet.

2020 Keynote Workshop

講師 —— 金牛頓工程師

技巧班 7/23 (四)

強化你的 Keynote 簡報力

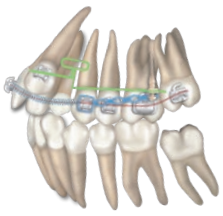
無論是 Keynote 新手或是略有經驗的使用者，在一天的簡報課程中，將精選介紹 Keynote 的重要工具，幫助你設計合適的動畫，分享設計資料視覺化的秘訣，並搭配 Mac 內建常用的影音工具來編修圖片和影像剪輯，金牛頓的教學團隊將教你如何使用 Keynote 創造出動人的專業簡報。

講師 —— 張慧男醫師

大師班 8/27 (四)

賈伯斯的簡報秘訣與設計要素

由國際知名的牙科講師張慧男醫師、主講的一天課程，將以他幽默風趣的演講風格來剖析賈柏斯的美學概念以及演講秘訣，利用實例來說明如何設計出視覺優且知識性豐富的專業演講。



- 名額有限，以繳費順序為依據。
- 舊生享特惠優惠價，限額4名。

- 若取消報名：開課30天前退款將扣除10%行政手續費；開課30天內退款將扣除30%行政手續費。
- 若請假延課：開課30天前提出，可免費延課一次；開課30天內提出，下次補課則以「舊生重溫價」計費。

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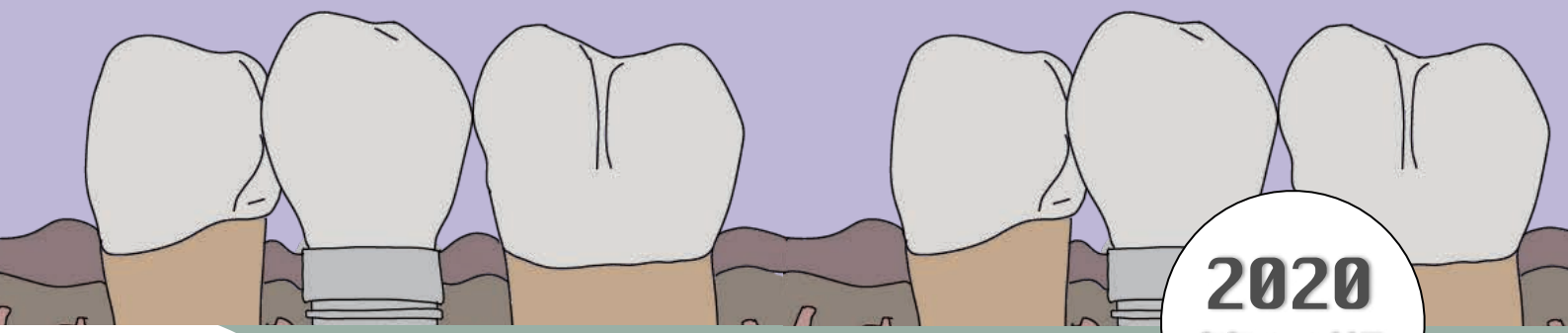
2020 Implant Forum
植牙論壇



2020
第11期

超強陣容

邀請超過十五位優秀講師分享植牙資訊

絕佳課程規劃

帶領學員進行最新臨床案例及期刊文章討論分析

2020 Implant Forum

本課表僅供參考，植牙論壇保留課程變動之權利

均可單堂報名

	日期（週五）	專題演講 9:00 - 10:30		植牙案例報告 10:45 - 12:00（30 分鐘 / 人）
1	3/13	陳明時 醫師（台灣假牙牙醫學會長、美國俄亥俄州立大學牙醫學院助理教授、美國加州州立大學舊金山牙醫學院副教授、台北醫學大學假牙研究所臨床教授） 主題：如何在自然牙根或者人工牙根建立穩定又平衡的咬合		
2	4/24	陳禮凡 醫師（長庚紀念醫院牙周病科兼任臨床指導主治醫師、美國波士頓塔夫茲大學牙周病專科醫師及牙周病碩士、美國牙周病專科醫學會專科醫師、中華民國植牙醫學會秘書長及專科醫師、禮凡牙醫診所院長） 主題：Advanced surgical techniques in implant dentistry	蕭浩宜 醫師（美國南加州大學植牙研究所進修、新綠牙醫診所院長）	張慧男 醫師（美國印第安那普渡大學齒顎矯正研究所博士）
3	5/22	吳尚霖 醫師（臺大醫院補綴科兼任主治醫師、耕莘醫院湖口仁慈分院主治醫師、尚霖牙醫診所負責人） 黃冠傑 技師（富緻牙體技術所牙技師、臺北科技大學經營管理EMBA、中臺科技大學牙體技術科學士） 主題：DTX Studio™ 數位化軟體應用 & 手術導板設計與生產		
4	6/12	胡剛碩 主任（新光醫院一般牙科主任、臺灣牙周病醫學會學術副主委、中華民國家庭牙醫學會學術副主委、台北市牙醫師公會學術委員） 主題：如何治療及避免植體周圍炎		
5	7/24	蘇筌瑋 醫師（高雄醫學大學牙周病學碩士、國際矯正植牙學會理事長） 主題：垂直前庭切線骨膜下隧道法 **下午另有 Hands-on 課程，可參考隔頁（費用另計）**		
6	8/28	謝清堯 醫師（台大牙醫系學士、台大臨床牙醫研究所補綴碩士、台大補綴科總醫師、台大補綴科兼任主治醫師） 主題：數位牙科的整合與應用		
7	9/25	林森田 醫師（中山醫學大學學士、國際矯正植牙學會院士、美國南加州大學植牙研究所進修） 翁蔚任 醫師（中華民國植牙醫學會專科醫師、中華民國家庭牙醫學會專科醫師、高雄醫學大學牙醫學士） 主題：From A to Z：完成你的第一個全口重建案例		
8	10/16	柯秋賢 醫師（竹北柯牙醫院長、高雄醫學大學牙醫學士、牙醫學研究所碩士、亞洲齒列再生研究會會員、中華植體美學醫師學專科醫師） 主題：Case report using the X-Guide dynamic navigation: From single tooth replacement to full mouth rehabilitation	黃育新 醫師（國際矯正植牙學會院士、台北醫學大學牙醫學系學士、台灣植牙醫學會專科醫師）	張慧男 醫師（美國印第安那普渡大學齒顎矯正研究所博士）
9	11/27	邱上珍 醫師（美國明尼蘇達大學牙周病學碩士、美國牙周病學會院士） 題目：Osseodensification and Densah Bur 的臨床運用 **下午另有 Hands-on 課程，可參考隔頁（費用另計）**		
10	12/18	黃怡豪 醫師（美國密西根大學牙周病專科認證、美國天普大學口腔生物學碩士、台灣大學附設醫院牙周病科兼任主治醫師、台北市牙科植體學學會副理事長） 主題：即拔即種與前牙美學究極		

地點：新竹市建中一路25號2樓（金牛頓藝術科技）

時間：每月一次、星期五上午 9:00-12:00

報名專線：03-5735676 #203

clinton@newtonsa.com.tw 陳建名

2020/07/24 (五)

蘇筌瑋 醫師

主題：垂直前庭切線骨膜下隧道法

課程時間：09:00～16:00

Modified VISTA: Crosslink between ortho., perio. and implant

Dr. Homa Zadeh 在 2011 年發表 VISTA，更簡單有效率的處理牙齦萎縮的問題，張慧男醫師跟著 Dr. Homa 老師學習後更改良為 modified VISTA 並廣泛應用在矯正與科技合作的案例，同時將成果發表在期刊與美國矯正年會中得到國際的肯定，我們利用案例一步步解析如何應用 VISTA 來處理各類的問題。

課程人數僅限 20 人，報名請趁早喔！

報名資訊

聯絡人: 3a Amy

連絡電話: 03-2209722#20 (8:30-17:30)

官方LINE ID: @3aonline

匯款資訊

ATM轉帳

玉山銀行 (808)-南桃園分行

帳號: 0842940022756

戶名: 三業股份有限公司

2020/11/27 (五)

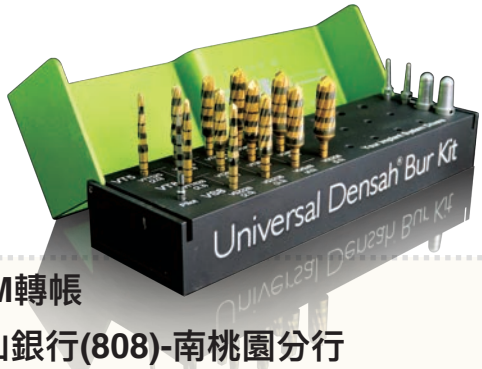
邱上珍 醫師

主題：Osseodensification and Densah Bur 的臨床運用

課程時間：09:00～16:00

2014 年 Dr. Huwais 發明 Densah® Bur，應用 Osseodensification 自體骨緻密術的觀念，經由特殊設計的 Bur，在鑽骨的同時，利用反向切削與水壓動力，保留骨屑，並將骨屑往兩側的骨小樑間隙推擠，使植體周圍的骨質更加緻密；同時也利用骨頭本身的彈性體特性，使切削下的骨屑在骨頭回彈時，填入植體螺紋間隙，增加植體和骨頭的接觸面積比例，幫助癒合。此外，Densah® Bur 也可運用在齒脊擴張與上顎竇增高術，是您臨床有利的幫手。

2019 年 10 月，Dr. Huwais 本人來台灣授課，講師邱上珍醫師參與其中。這次課程邱醫師將清楚闡釋 Dr. Huwais 上課的重點，並分享她個人的使用經驗。下午的 Hand-on 課程，將讓您實際體驗 Densah® Bur 的魅力，並了解操作的細節。有興趣的醫師千萬不要錯過！



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"From this book we can gain a detailed understanding of how to utilize this ABO system for case review and these challenging clinical cases from start to finish."

Dr. John JJ Lin, Taipei, Taiwan

"I'm very excited about it. I hope I can contribute to this e-book in someway."

Dr. Tom Pitts, Reno, Nevadav, USA

"A great idea! The future of textbooks will go this way."

Dr. Javier. Prieto, Segovia, Spain

"No other book has orthodontic information with the latest techniques in treatment that can be seen in 3D format using iBooks Author. It's by far the best ever."

Dr. Don Drake, South Dakota, USA

"Chris Chang's genius and inspiration challenges all of us in the profession to strive for excellence, as we see him routinely achieve the impossible."

Dr. Ron Bellohusen, New York, USA

"This method of learning is quantum leap forward. My students at Oklahoma University will benefit greatly from Chris Chang's genius. "

Dr. Mike Steffen, Oklahoma, USA

"Dr. Chris Chang's innovation eBook is at the cutting edge of Orthodontic Technology... very exciting! "

Dr. Doraida Abramowitz, Florida, USA

"Dr. Chang's technique is absolutely amazing and cutting-edge. Anybody who wants to be a top-tiered orthodontist MUST incorporate Dr. Chris Chang's technique into his/her practice."

Dr. Robert S Chen, California, USA

"Dr. Chris Chang's first interactive digital textbook is ground breaking and truly brilliant! "

Dr. John Freeman, California, USA

"Tremendous educational innovation by a great orthodontist, teacher and friend."

Dr. Keyes Townsend Jr, Colorado, USA

"I am awed by your brilliance in simplifying a complex problem."

Dr. Jerry Watanabe, California, USA

"Just brilliant, amazing! Thank you for the contribution."

Dr. Errol Yim, Hawaii, USA

"Beyond incredible! A more effective way of learning."

Dr. James Morrish Jr, Florida, USA

New Release!

Dr. Chris Chang setting up before the 2020 AAO Annual Virtual Meeting with AAO president, Dr. Gary Inman.